MARINE REVIEW.

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Extensive Dock Improvements at Conneaut.

The Review learns from an authentic source that the Carnegie interests at Conneaut have definitely decided to make the improvements at that port, regarding which there has recently been so much speculation—indeed, the contracts for a considerable portion of the work have already been let. The whole project is somewhat more extensive than was indicated by first reports. The dock company at present controls all property on the west side of the river from the piers to the bend in the river, or a distance of some 2,000 feet from the inner end of the piers. This space includes the water frontage occupied by the ore docks and by the docks used by the car ferry, as well as the new slip completed last spring. The improvements now contemplated will be made on the east side of the river, where the land is at present little more than a swamp, and the new docks will extend from the piers to the bend in the river.

The contract for the necessary dredging and the construction of the docks has been let to the Standard Contracting Co. of Cleveland. The dock will be from 1,200 to 1,500 feet in length and 500 feet in width, and will be known as dock No. 4. It will be provided with three tracks and there will be two dumping heaps, reasonable distances apart. The river will be dredged throughout to a depth of 20 feet, and the earth taken out, which, it is estimated, will aggregate from 2,000,000 to 3,000,000 yards, will be used in making the land for the dock. The dredging will also result in a considerable widening in the channel, which upon the completion of the work will have a width of 210 feet at the narrowest part and 550 feet near the car ferry slip. This will, of course, enable any of the large freighters to turn in the river. The work of dredging and making ground will be commenced at once and it is expected that the new docks will be completed by February. No specifications have as yet been sent out or bids asked for equipment for this new deck, but the machinery will, of course, be modern in all respects. This opening up of the east side of the river at Conneaut will almost double the dock capacity.

The Several Engine Break-downs.

The several recent break-downs of engines on lake steamers have certainly occurred very close together. The amount of damage has in all cases been very heavy. An account of the accident to the engines of the passenger steamer Manitou of Chicago, which resulted in that vessel being laid up for the balance of the season, was given in a recent issue of the Review by the chief engineer of the ship, Mr. Richard Peck, now the chief engineer of the side-wheel steamer City of Chicago, Wm. J. McClure, also furnishes the Review with an account of the accident to his vessel.

Chief Engineer McClure of the Chicago says: "When the accident occurred, about 9:45 p. m. on Sept. 4, I was standing forward of the shaft on the starboard side in the engine room, looking at the cranks and thinking how finely the engine was working. The crank pin strap broke while crossing the lower center. I got to the throttle as quickly as possible and shut it and unhooked the engine so as to shut off the steam. The low pressure cylinder was completely wrecked, the cylinder head, lower head, condenser top and condenser broken, and the brackets on the under side of the bed plate cracked, so that it will be necessary to provide a new bed plate. The high pressure cross-head was broken in two in the center under the strap that fastens the cross-head to the piston, and the high pressure links were badly bent at the lower end. The high pressure piston rod was also bent. The cylinder head and cylinder have been examined and so far look all right, although the lower head is cracked. The skeleton of the beam is broken in several places, but the strap appears to be all right. However, the paint will be burned off and the strap thoroughly tested before it is again used. The cup and pillow block on the port side of the beam center are broken, the air pump cross-head is badly bent, the follower and guards on the air pump bucket are bent and will need to be replaced, and the discharge valve of the chamber was badly broken. The air pump and the air pump bed plate remain intact and the steam chests on both engines are in good condition. There was not a moment's warning before the accident. The engine was working very quietly at the time, the pressure of steam being 95 pounds and the revolutions 29½ per minute."

The break-down of engines on the Greyhound, which also took that vessel off her route long before the excursion season was at an end, was probably even more complete than any of the several that have occurred of late. The Greyhound's engine is of the walking-beam type with cylinder 60 inches in diameter and 12 feet stroke. Chief Engineer Robert H. Medler of this steamer says: "My engine is a total wreck with the exception of the crank and shafts. The connecting rod broke about 5 feet from the crank, went through the separation piece into the condenser, split the cylinder half way down on both sides, knocked the bottom out of the air pump and cracked the beam. The connecting rod at the point where it gave way is 7 inches in diameter and the break is square cut and clean."

The steamer Iron Age, one of the wooden freight carriers that is also in the list of recent break-downs, has a steeple compound engine with cylinders of 24 and 44 inches diameter and 32 inches stroke. The breaking up of these engines was due to the strap at the bottom end of the connecting rod letting go, just opposite the split in the crank pin brasses. The high pressure cylinder head was broken completely out, and both high and low pressure cylinders cracked from top to bottom. All four columns were broken squarely off, just below the entablature, and the piston rods and connecting rod were badly bent and twisted. The air pump beam was bent and the bottom of the cylinder broken out, necessitating practically a complete new engine from the bed plate up.

Bertram Engine Works Co. to Rebuild.

Mr. George H. Bertram, president of the Bertram Engine Works Co., whose plant at Toronto was recently seriously damaged by fire, informs the Review that it has been decided to rebuild without delay. This will be welcome news to many well wishers for the firm's prosperity. The Bertram company had installed the initial modern improved ship building plant in the Dominion, and that the confidence in their ability evidenced by the character of the contracts awarded them, was fully justified, has been proven by the quality of the work which the firm has been turning out. Mr. Bertram in his letter to the Review says that the firm hopes before long to have buildings erected and machinery installed on a larger scale than before. The Richelieu & Ontario Navigation Co.'s steamer Toronto and the grain barge Nadine, both now nearing completion, and which were somewhat damaged by the flames, will be but slightly delayed by the fire, more especially as the engine works of the Bertram company, which is entirely separate from the ship yard, was not injured as reported in the newspaper dispatches regarding the fire.

When the side-wheel steamer for the Richelieu & Ontario company was begun some time ago by the Bertram company, it was said that the contract was for two such vessels. This was a mistake, but it is understood that the contract for the second vessel was closed only a short time ago.

Navigation Aids on Lake Erie.

Vessel masters generally will be interested in changes in two aids to navigation on Lake Erie. It is proposed to erect a steam fog signal at Erie, Pa., at the northeast corner of the peninsula. The bell at the pierhead at the entrance to the harbor will, of course, still be kept in operation, and in all probability will be very much improved by being raised above its present level, it being now down very near the bottom of the light-house. There is a prevalent opinion, also, that the present main Erie light on the bluff to the east of the city is of practically no benefit to commerce, the Presque Isle light, the pierhead lights and ranges, and the lights of the city rendering it entirely superfluous.

There seems to be every likelihood of the fulfillment before long of the desire on the part of the shipping interests of Lake Erie, that the light-house on West Sister island be changed in location. The light-house is located on low grounds at the southern end of the island, and is invisible through a large arc to the north and northeast. The vessel interests desire that the light-house be rebuilt on a higher point of the island, so that it can be seen from all directions. Officers of the Lake Carriers' Association have declared in favor of these changes.

New Markets for American Ship Plates.

British steel manufacturers continue to manifest uneasiness regarding the use of American steel plates in the ship yards of England and the Clyde. In this connection it has just been recalled that when the Dirigo, the first steel sailing ship built in America, was constructed by Messrs. Sewall & Co. at Bath, Me., in 1894, all the steel employed in her construction was made by D. Colville & Co. of Glasgow. At that time it was found that ship plate could be delivered on the Atlantic coast from England cheaper than from the mills of this country. It is only a few years since the Dirigo was built. The steel manufacturers of this country not only make now all the steel required in the building of our own ships, but have of late exported several cargoes of plates on orders from British builders. The most recent cargo was taken to Ireland by one of the Head liners of the Ulster Steamship Co., and it is reported in connection with this shipment that Harland & Wolff, the well-known ship building firm of Belfast, Ireland, has made a contract with the Illinois Steel Co. for the delivery of 100,000 tons of steel plates. This steel, it is said, is being shipped through the port of Montreal. Thirty-four carloads, according to the report, have just been shipped via the Beaver Line to Liverpool, and seventy carloads additional are now in the Grand Trunk railroad yards awaiting shipment.

More Lights at Parry Sound.

Masters of grain-carrying vessels who expect to trade to Parry Sound on Georgian bay this fall were pleased with the announcement in the last issue of the Review that Col. Anderson of the Canadian department of marine and fisheries is placing some much-needed Pintsch gas buoys at the approach to the sound. The buoy at the Seguin bank will be black, as will also the buoy at Spruce island shoal, while the buoy at Hopper island shoal will be red. It is announced that it is also the intention of Col. Anderson to place a buoy at the gate opposite Spruce island shoal. A light has been built at Depot island at the entrance to Depot harbor and will soon be put in operation. This is another long-desired aid. There is a probability, moreover, that Col. Anderson will arrange to change some of the lights, so as to better mark the old or north channel, which carries the better water. The proposed changes will possibly include the removal of the light-house from Hugh rock to Carling rock and the erection of a new light-house near Killbear point. This arrangement, it is argued by marine men conversant with the situation, will result in a pretty satisfactory solution of the present difficulties of navigation in this vicinity.

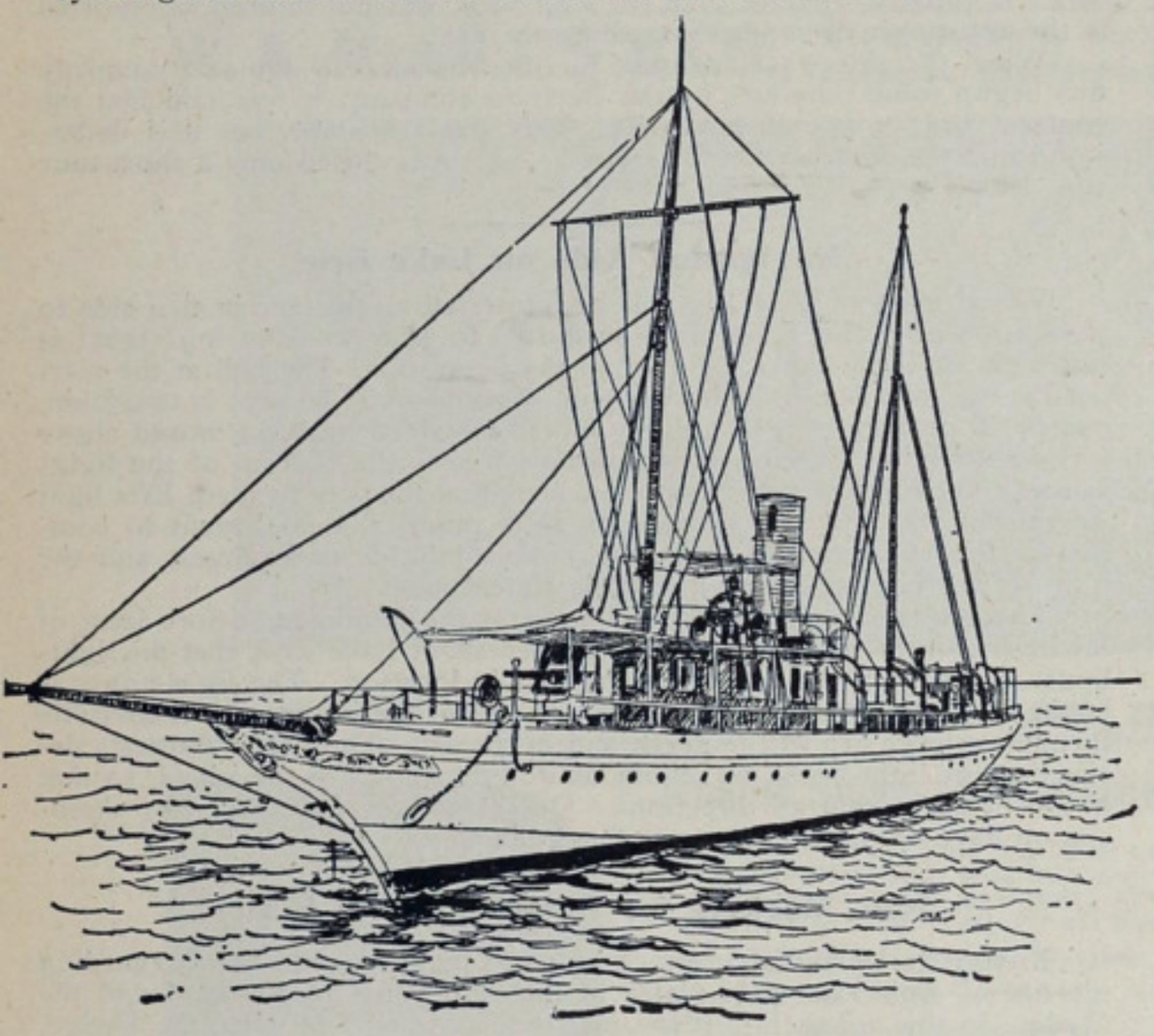
A. Mosher, a pioneer vesselman and lumber dealer on the great lakes, died this week at Troy, N. Y. Mr. Mosher was among the first tugmen on the Chicago river and was associated for many years with Capt. J. S. Dunham in the tug and vessel business.

PRESIDENT'S YACHT.

THAT DISTINCTION CONFERRED UPON THE SYLPH, RECENTLY COMPLETED AT THE ROACH SHIP YARD, CHESTER, PA.

The steel steam yacht Sylph has been formally selected as the president's yacht, and will be used by the chief executive and the members of his cabinet and their families for pleasure excursions up and down the Potomac river. The Sylph, which went into commission only a few weeks ago, was designed by Gardner & Cox, naval architects of New York city, and was built at the Roach ship yard, Chester, Pa. She is 152 feet extreme length, 20 feet beam and 8 feet 9 inches draught. The yacht is schooner rigged and equipped with a triple-expansion engine and two Almy water tube boilers. The dining saloon, which is forward on deck, is finished in mahogany and connects with a conveniently arranged pantry. Below there are four large staterooms, finished in white and gold, a large main saloon, bathroom, lavatories, and at the extreme after end a double stateroom for the captain and engineer. The crew's quarters are situated forward. Below the cabin floor, forward and aft, are the water tanks, storerooms, etc. The vessel has a coal capacity of 50 tons and is fitted throughout with electric lights and all modern improvements.

The Sylph, which is a virtual duplicate of the steam yacht Malay, also constructed at the Roach yard for private parties this year, was purchased by the government while she was on the stocks and still unnamed. Ac-



THE PRESIDENT'S NEW YACHT SYLPH.

cording to the stipulations of the purchase the vessel was to develop at least 15 knots, but to the surprise of everyone, except her builders, she showed on trial 17 knots with tidal corrections. The war with Spain had not been concluded when she was ready to be turned over to the government, and the boat was accordingly fitted with a signal yard and given an armament of two 6 and two 3-pound rapid-fire guns, and arrangements made to place her regularly in the patrol fleet. She is shown in this trim in the accompanying picture from the New York Sun. She has been ordered to the Washington navy yard for alterations before entering upon her new duties. The vessel was designed with the idea of constituting a comfortable cruiser, while being enabled, by reason of her light draught, to enter almost any coast port. Although the greater portion of the Sylph's service will probably be on the Potomac river, she is eminently fitted for sea cruises.

TWO MILLION TONS EXCESS.

SAULT CANAL FREIGHT MOVEMENT, EAST AND WEST, TO SEPT. 1 EXCEEDS ALL PREVIOUS RECORDS BY THAT AMOUNT.

Judging by the showing made to Sept. 1, an early opening of navigation, deeper channels and larger vessels will combine to make the present season a most memorable one on the great lakes in the matter of the amount of freight carried. St. Mary's Falls canal reports,summarized by the Review, show that whereas there were up to Sept. 1 fewer vessel passages with a less aggregate of registered tons than during the corresponding period in 1896, the total movement of freight, east and west, through the two canals this season has been almost 2,000,000 tons in excess of the freight movement of two years ago. Thus from the opening of navigation until Sept. 1, 1896, there passed through the canals 12,925 vessels of 11,831,398 tons carrying 10,678,859 tons of freight, while during the corresponding period this year the passages amounted to only 11,029 and the registered tonnage to only 11,055,554, but the freight movement aggregated 12,613,639 net tons. With last year the comparison shows less contrast, for the reason that the larger boats were at that time coming into commission. To Sept. 1, 1897, there was a total of 10,634 vessels, of 10,697,153 registered tons, with a freight movement of 10,805,004 net tons. It will thus be seen that the passages in 1897 were upwards of a thousand short of this season and the registered tonnage over 1,000,000 short, while at the same time the freight movement lacks only 200,000 tons of being a round 2,000,000 tons short of this season's record. If the present percentage of increase could be maintained, this season's movement of freight through the canals would be fully 3,000,000 tons in excess of that of any previous year since their opening. The gain will be large but it must be remembered that the present increase is due in part to the early opening of navigation.

In several of the principal items of freight there is a striking discrepancy between the returns for this year and for last. The movement of hard coal has been pretty even both years, the figures for this year being 277,131 tons as against 296,183 tons last year, but the movement of soft coal shows a literal doubling up, the aggregate shipments this year being 2,139,778 tons, as against 1,105,627 tons on Sept. 1 a year ago; but it must be remembered, of course, that a strike prevailed among the soft coal miners during the summer of 1897. The principal gain, of course, is in shipments of iron ore. The movement of wheat so far in 1898, 11,514,527 bushels, is little more than half that at this date last season, the figures for the latter being 22,730,621 bushels. The shipments of flour also show a perceptible falling off. The movement of freight of all kinds through the canals for the past three seasons to Sept. 1 was as follows:

MOVEMENT OF PRINCIPAL ITEMS OF FREIGHT TO AND FROM LAKE SUPERIOR.

ITEMS.	To Sept. 1, 1898.	To Sept. 1, 1897.	To Sept. 1, 1896.
Coal, anthracite, net tons	277,131	296,183	224,888
Coal, bituminous, net tons	2,139.778	1,015,627	1,727,071
Iron ore, net tons	7,714,053	6,689,269	5,826,100
Wheat, bushels	11,514,527	22,730,621	32,732,420
Flour, barrels	3,503,875	4,573,061	4,321,426

REPORT OF FREIGHT AND PASSENGER TRAFFIC TO AND FROM LAKE SUPERIOR, FROM OPENING OF NAVIGATION TO SEPT. 1 OF EACH YEAR FOR THREE YEARS PAST.

EAST BOUND.

ITEMS.	Designation.	To Sept. 1, 1898.	To Sept. 1, 1897.	To Sept. 1, 1896.
Copper	Net tons	75,567	79,322	76,510
Grain, other than wheat	Bushels	14,104,367	12,763,415	13,032,837
Building stone	Net tons	4,063	2,894	12,833
Flour	Barrels	3,502,973	4,572,811	4,321,364
Iron Ore	Net tons	7,714,053	6,689,269	5,826,100
Iron, pig	Net tons	20,215	5,514	17,424
Lumber	M. ft. b. m.	520,725	468,537	446,023
Silver ore	Net tons	.....	5	140
Wheat	Bushels	11,514,527	22,730,621	32,732,420
Unclassified freight	Net tons	145,097	159,779	125,796
Passengers	Number	15,316	14,748	15,672

WEST BOUND.

Coal, anthracite	Net tons	277,131	296,183	224,888
Coal, bituminous	Net tons	2,139,778	1,015,627	1 727,071
Flour	Barrels	902	250	62
Grain	Bushels	7,715	.....	1,119
Manufactured iron	Net tons	149,982	70,147	55,158
Salt	Barrels	178,365	145,398	130,512
Unclassified freight	Net tons	228,521	217,660	193,696
Passengers	Number	18,522	16,793	16,232

SUMMARY OF TOTAL FREIGHT MOVEMENT IN TONS.

	To Sept. 1, 1898.	To Sept. 1, 1897.	To Sept. 1, 1896.
West bound freight of all kinds, net tons	2,823,396	1,628,699	2,228,829
East bound freight of all kinds, net tons	9,790,243	9,176,305	8,450,130
	12,613,639	10,805,004	10,678,859

	Vessel passages.	Registered tons.	Freight tons, net.
To Sept. 1, 1898	11,029	11,105,554	12,613,639
To Sept. 1, 1897	10,634	10,697,153	10,805,004
To Sept. 1, 1896	12,925	11,831,398	10,678,859

American Iron and Steel Abroad.

Taken in connection with the recent reports of orders for American steel received by manufacturers in this country from various foreign firms, especial interest attaches to the following notice just issued by the state department: "Heretofore, certain grades of iron have been imported from Spain and Great Britain into France; but, as the price of these products grows dearer, pig iron and Bessemer pig will be imported from the United States, if advantageous freight rates can be secured. The high price of wheat and the great demand on this side makes eastward freights very high; and, as iron and steel cannot be exported unless the rates are very low, this industry has been neglected. France is ambitious now to make improvements in her marine service, and it is probable that the prices of these commodities will advance. Now is the time for Americans to make an assault on the iron and steel markets of Europe."

TESTS OF LAKE STEAMERS.

THEY ARE ALIKE IN MOST PARTICULARS, BUT ONE IS FITTED WITH HOWDEN HOT DRAFT AND THE OTHER IS DEPENDENT UPON NATURAL DRAFT.

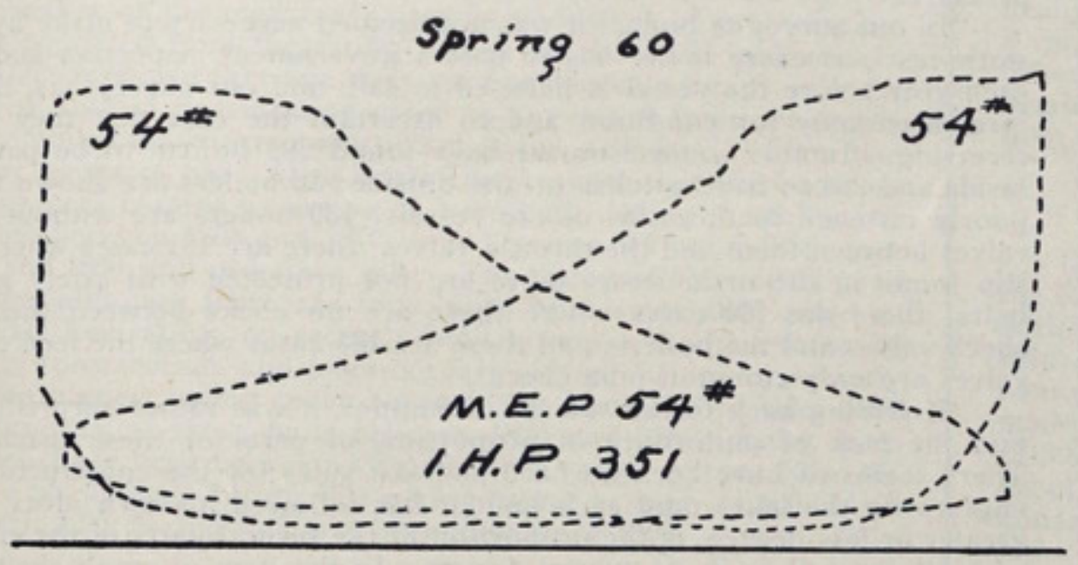
"With the large number of installations of Howden hot draft made in lake vessels last winter," says Mr. Gilbert N. McMillan of the Dry Dock Engine Works, Detroit, "we will have some interesting tests to present to vessel men for their consideration. The increasing use of this system of draft throughout the world, in the biggest of the transatlantic liners building in Germany and in hundreds of vessels from the Clyde and the ship building districts of England, is sufficient endorsement of its efficiency, but the most convincing results are those obtained from our own lake vessels."

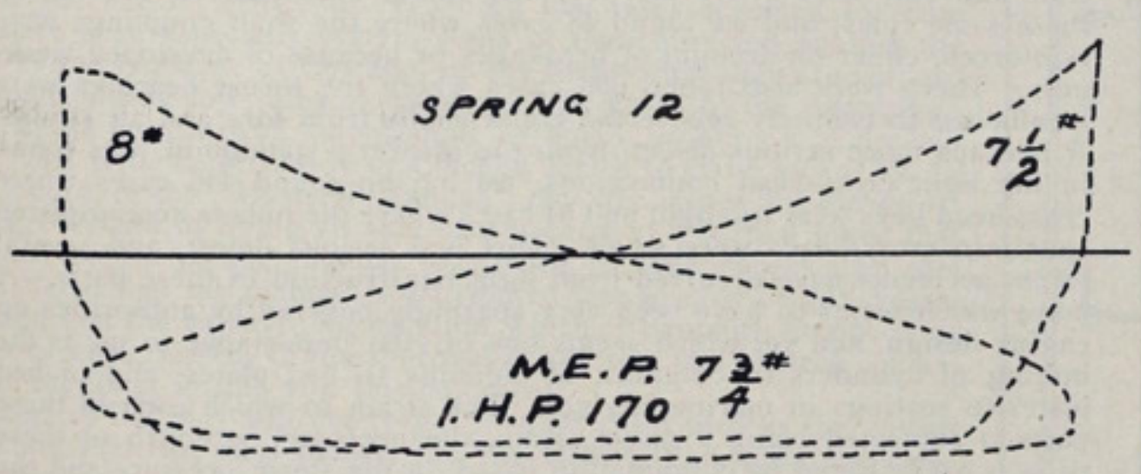
Two of the tests referred to by Mr. McMillan are presented herewith. The wooden steamers Iron Age and Iron Chief are in most respects alike. The Iron Age is one of the vessels lately fitted with Howden draft. Engines are steeple compound in both cases, but the Iron Chief, which is not fitted with the draft, has an advantage in fire-box boilers, which type is most economical. It will be noted that the coal burned per horse power per hour on the Iron Chief is 2.5 pounds, against only 1.72 pounds on the Iron Age. Cards from the engines as represented herewith were in both cases made in connection with the tests.

TRIAL OF IRON AGE, FITTED WITH HOWDEN DRAFT.

Detroit to Cleveland, July 18, 1898, trial by J. O. Snyder, chief engineer:

Particulars of vessel—Load, 1,741 gross tons; draught, 16 feet 9 inches aft and 16 feet 1 inch forward; engine, steeple compound, 24 and 44 inches by 32-inch stroke; one Scotch boiler, 12 feet 3 inches by 11 feet 6 inches long, allowed 125 pounds of steam; two furnaces of 42 inches diameter;





total heating surface, 1,800; total grate surface, 38½; ratio, 46.4 to 1; length of grate, 5 feet 6 inches; fan, 42 inches diameter of wheel; fan engine, 6 by 6 inches.

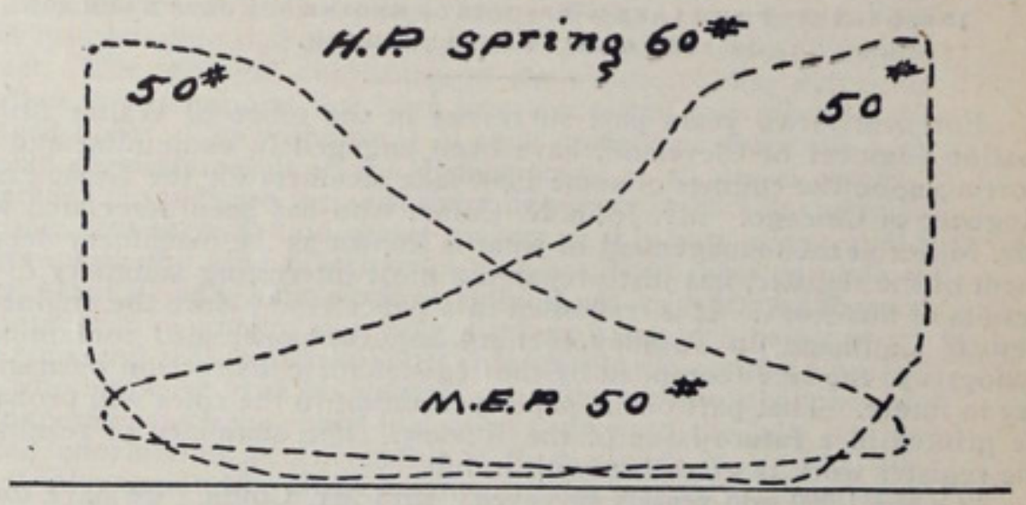
Trial data—Steam pressure, 114 pounds; vacuum, 19 inches; mean effective pressure, H. P., 53.5 pounds; mean effective pressure, L. P., 7.71 pounds; M. E. Pref. to L. P., 23.6 pounds; revolutions, 90; indicated horse power, H. P., 351; indicated horse power, L. P., 170; total I. H. P., 521; air pressure at fans, 1⅛ inches; ratio, H. P. to G. S., 13.5; ratio, H. S. to H. P., 3.6; time of test, six hours five minutes; coal burned, Pittsburg lump of good quality, total, 5,394 pounds; coal burned per hour, 887 pounds; coal burned per H. P. per hour, 1.72 pounds; coal burned per square foot of grate, 23 pounds; temp. of feed water, 142°; speed of vessel, 10 miles per hour.

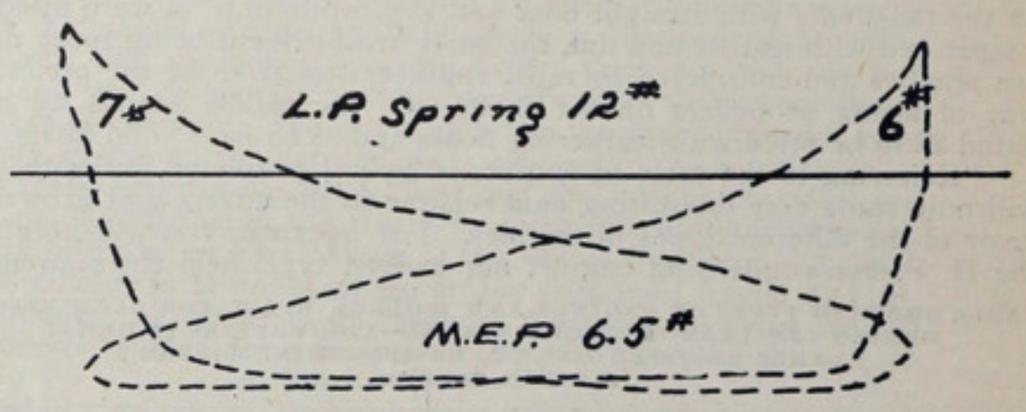
TRIAL OF IRON CHIEF, NATURAL DRAFT.

Trial made Aug. 15, 1898, while towing consort Iron Cliff. Cards taken by J. O. Snyder, chief engineer:

Particulars of vessel—Load of Iron Chief, 1,235 net tons; load of Iron Cliff, 1,440 net tons; total load, 2,675 net tons; draught of Iron Chief, 14 feet 10 inches aft and 13 feet 10 inches forward; draught of Iron Cliff, 14 feet aft and — forward; engine, steeple compound, 23½ and 48 inches by 36-inch stroke; one fire-box boiler, 10 feet diameter and 16 feet long, allowed 100 pounds steam; length of grate, 5 feet 10 inches.

Trial data—Steam pressure, 100 pounds; vacuum, 21½ inches, revolutions, 86.76; mean effective pressure, H. P., 49.91 pounds; mean effective pressure, L. P., 6.46 pounds; M. E. Pref. to L. P., 18.4 pounds; indicated horse power, H. P., 341; indicated horse power, L. P., 182; total I. H. P., 525; ratio, H. P. to G. S., —; ratio, H. S. to H. P., —; coal burned, Tunnel





Hill mine run quality, 7,940 pounds; coal burned per hour, 1,312 pounds; coal burned per horse power per hour, 2.5 pounds; temp. of feed water, 140°; weather, light head wind; speed of ship, 7.86 miles per hour.

AMERICAN SHIP YARDS.

ARGUMENT OF THEIR SUPREMECY STOUTLY MAINTAINED BY IRVING M. SCOTT OF THE UNION IRON WORKS UPON HIS RETURN FROM EUROPE.

Mr. Irving M. Scott, general manager of the Union Iron Works, San Francisco, and famous as the builder of the battleship Oregon, has just returned from an extended European tour, firm in the conviction that American ship builders can build better vessels and build them cheaper than their competitors abroad and that therein is a secret which will enable their ultimate domination of the industry. In speaking of existing conditions Mr. Scott said:

"The attention of the world has been attracted to America by the war, in a degree that would have been impossible of accomplishment by any other means. The growth of our merchant marine will follow as a natural sequence and the demand for an American merchant marine will eventually carry with it the policing of the seas. It is an utter fallacy, too, that theory that European ship builders can produce vessels more cheaply than they can be built in this country. I am also certain that we can build 'tramp' ships in this country just as cheaply as they can build them on the Clyde or anywhere else on earth. While I was on the other side I visited and inspected carefully the great ship yards of Russia, France, Germany, England, Norway, Sweden, Holland, Belgium and Denmark, and I can say in all candor that I saw nothing to in any way discourage the American ship builder. The French, who are perhaps the most progressive of all the foreign builders, and who have made really wonderful advancement during the past half dozen years, have, I noticed, been by no means backward about borrowing ideas from American ship builders. Although the French have made the most rapid strides, the English ship builders seem to get the best practical results, and they also seem to have gotten bravely over their disinclination to accept our ideas in ship building. A most phenomenal growth has characterized the ship building of Germany and all the later productions of the ship builders are surprising in their magnificence. I secured a plan of the new steamship to be built by a German firm for the Hamburg-American line, and I feel sure that it will be superb. And, by the way, while I was in Germany I learned that the new naval program contemplates the building of fourteen battleships and forty-three cruisers, all to be built in German yards and all to be completed not later than 1905.

"With the warships of the world those of the United States can compare most favorably, but, although the recent war has proven the efficiency of our naval vessels, it will not do for us to be remiss in energy. Ship building is an art, and like every other art, it progresses. It is only a natural course of events that efforts at perfecting and improvement should go on steadily, but it is more essential in the building of war vessels than in any other industry or art. In my opinion our naval officers should direct their attention to higher power guns and superior gun powder. It is in respect to these that we are being distanced by the European nations. In the case of the merchant marine, I am a firm advocate of protection for American ships. It is necessary if we are to compete with the vessels of other nations which do subsidize their ships."

Mr. Scott was disinclined to talk about the direct results of his trip. He did say, however, that "the Union Iron Works has now plenty of work on hand."

ENGINES OF THIRTEEN HUNDRED SHIPS.

A MOST INTERESTING SUMMARY OF FACTS ABOUT THE MACHINERY OF THE BUSINESS FLEET OF THE LAKES—RESULTS OF ENGINE SURVEYS MADE FOR THE GREAT LAKES REGISTER.

For nearly two years past surveyors in the office of Walter Miller, marine engineer of Cleveland, have been engaged in examining and reporting upon the engines of some 1,300 lake steamers for the Great Lakes Register of Chicago. Mr. John N. Coffin, who has been associated with Mr. Miller in the management of what is known as the machinery department of the register, has just prepared a most interesting summary of the results of this work. It is embodied in a paper read before the engineers' club of Cleveland on Tuesday evening last, the paper also containing a synopsis of the rules compiled by the register for construction of machinery in future. That part of the paper pertaining to the rules will probably be printed in a future issue of the Review. The summary of results of the register work is given herewith in full.

"Of the 1,300 odd vessels surveyed," says Mr. Coffin, "we have found 1,150 to be screw propellers, and a trifle over 50 to be paddle, or side-wheel, propellers; the balance being schooners or tow barges, which were equipped with boilers and steam pumps, or hoisting or steering machinery. Of those fitted with screw propellers, we have found that 960 had solid cast wheels, 6 of them being of bronze, 8 of steel and 946 of cast iron; 185 had sectional wheels, one of them being of bronze, 6 steel and 178 cast iron. Of the entire number, 1,060 of these propeller wheels were fitted on the tail shafts with straight bore and key, while only 74 were fitted on a taper end with feather and nut, the latter arrangement being more modern practice and considered by most engineers today to be the preferable way of fitting propellers on the shafts. Of the paddle wheels we have found 23 to be fitted with feathering floats and 29 to have solid floats.

"Referring to the table of engines, which is presented herewith, you will note some very interesting data relative to the advent and growth in favor of the different types of engines. For instance, you will note that the H. P. non-condensing engine, our earliest type, held the supremacy

TABLE SHOWING TYPES OF ENGINES AND BOILERS BUILT FOR LAKE VESSELS DURING TEN-YEAR PERIODS SINCE 1860—ALSO RATINGS IN GREAT LAKES REGISTER GIVEN TO VESSELS BUILT WITHIN SIMILAR PERIODS.

	1860 to 1869	1870 to 1879	1880 to 1889	1890 to 1898
ENGINES.				
H. P. non-condensing	40	93	185	93
" condensing	6	10	5	4
Steeple compound	22	62	89	39
F. & A. "	5	12	154	99
Triple Expansion	.....	.....	67	147
Quadruple "	.....	.....	1	6
Walking beams	8	10	8	7
Inclined and Horizontal	1	2	7	9
BOILERS.				
Firebox	18	97	392	224
Scotch	1	8	193	348
Water Tube	.....	1	.....	35
PRESSURES.				
Below 50 lbs..	5	3	2	3
Above 50 lbs. and " 75 " ..	4	19	23	10
" 75 " " " 100 " ..	5	59	122	29
" 100 " " " 125 " ..	1	25	318	173
" 125 " " " 150 " ..	.....	3	52	184
" 150 " " " 175 " ..	.....	1	70	161
" 175 " " " 200 " ..	.....	.....	.....	19
" 200 " " " 225 " ..	.....	1	1	12
225 "	.....	.....	.....	2
250 "	.....	.....	.....	12
265 "	.....	.....	.....	2
300 "	.....	.....	.....	1
RATINGS.				
50	3	4	4	2
55	2	3	2	4
60	5	11	11	2
65	4	10	16	7
70	2	18	27	6
75	2	19	58	23
80	1	25	78	40
85	1	18	88	54
90	.....	9	138	119
95	.....	5	87	124
100	.....	.....	62	223

in numbers up to the end of the decade 1880 to 1890; this is accounted for in some degree, during the latter part of this period, by the fact that there were many small boats and tugs built. The H. P. condensing engine cuts very little figure on the lakes, there being a total of only 25 in existence. The steeple compound engine had an early start, 22 of them, now in existence, having been built earlier than 1870, 62 during the next 10 years, and 89 during the period from 1880 to 1890. This type then gave place to the advent of the fore and aft compound and triple-expansion types. Of the fore and aft compound type we have five engines built earlier than 1870. This type also reached the height of its popularity during the years 1880 to 1890, and then gave way rapidly to the triple-expansion engine, which makes its first appearance during this term with 67 examples, and which has held its supremacy with 147 engines built since 1890. The first quadruple-expansion engine was built in 1889, and, since that date, there have been 6 vessels equipped with this type of engine, and there are several of this type now under construction. Of the paddle-wheel boats, you will note that 33 engines are of the common and well-known walking-beam type, while 19 are either horizontal or inclined engines.

"It is also interesting to note the changes which have taken place in the types of boilers. The marine fire-box boiler is the most common type, though it has lost its prestige, the Scotch boiler having rapidly displaced it of late years. Seven hundred and thirty-one boilers of this type are in use today, 18 of them having been built earlier than 1870, 97 of them between 1870 and 1880, 392 between 1880 and 1890 and only 224 since 1890. The Scotch type of boiler has one example built earlier than 1870, 8 between that and 1880, 193 between 1880 and 1890, and 348 built since 1890, a very rapid increase during the last seven years. The marine water tube boiler is of more recent date, only one having been built earlier than 1880. There are none of this type now on the lakes built between 1880 and 1890, but there are 35 vessels, built since 1890, equipped with this type of boiler, and there are several vessels now under construction which are to be equipped with this type of boiler, and it is the opinion of many engineers that the water tube boiler is the coming boiler for marine use. It is also interesting to note the gradual increase in pressures in boilers built during these several periods. Of those built earlier than 1870, 100 pounds per square inch is the highest pressure, and there is only one boiler of this period carrying as high as 100 pounds, and only one carrying 90 pounds, most of the boilers built during this period carrying pressures from 40 to 55 pounds. Most of the boilers built between 1870 and 1880 carry either 80 pounds, 90 pounds or 100 pounds pressure, though there are a few built during this period carrying considerable higher pressure, and one carrying as high as 200 pounds. During the period of 1880 to 1890, 276 boilers carry 100 pounds pressure or less, and 318 carry more than 100 pounds; but there is only one boiler built during this period, carrying as high as 200 pounds; 29 carrying 160 pounds; 39 carrying 150 pounds, and the balance ranging from that down to 100 pounds pressure. Since 1890 the tendency has been to a considerable increase of pressure, only 91 of the boilers built during this period carry as low as 100 pounds, while 517 carry pressures higher than 100 pounds. Of this number 75 carry 120 pounds; 82, 125 pounds; 45, 150 pounds; 83, 160 pounds; and from that on up to 300 pounds, there being one boiler carrying this highest pressure, 2 boilers carrying 265 pounds pressure, and 12 boilers carrying 250 pounds pressure.

"In our survey of boilers it was not deemed necessary to make hydrostatic tests, as every boiler has to pass a government inspection and test each year before the vessel is licensed to sail, and our survey has, therefore, been only for condition and to ascertain the care that they were receiving. In this connection we have found 295 boilers to be patched inside and 264 to have patches on the outside; 82 boilers are shown to be poorly fastened to the hulls of the vessels; 139 boilers are without stop valves between them and the throttle valves; there are 191 cases where the slip joints in the main steam pipes are not protected with safety guard bolts; there are 134 cases where there are no cocks between the feed check valves and the boilers; and there are 165 cases where the feed check valves are only common pipe checks.

"Referring back to the subject of engines, it was rather surprising to find the lack of uniformity of proportion of parts of these machines. There seems to have been no hard and fast rules for the construction of engines on the lakes, and each builder has followed his own ideas, to a greater or less degree, in the proportion of the several parts of the engine he built, as well as in its special design. In the item of crank shafts we have found that about 400 were of the solid forged type, 17 of these being of steel and 383 of wrought iron; 780 were built-up shafts, of which 23 were of interchangeable sections, 13 of them being of steel and the balance of wrought iron. Of the total number, 354 were found to be light in section, according to Lloyd's rules for determining the size of crank shafts. We also found 106 cases where the intermediate shafts were light of section, and 387 cases where the propeller shafts were light of section, by these same rules; and we found 48 cases where the shaft couplings were reinforced, either on account of breakages or because of developed weakness. There were also found 296 cases where the thrust bearings were insufficient to properly relieve the crank shafts from fore and aft strains. A perhaps more serious defect, from the insurer's standpoint, was found in the light cross-head connections, we having found 446 cases where cross-head keys were too light and 54 cases where the nuts fastening piston rods into cross-heads were small. This is a serious defect, and several recent accidents have occurred from light construction in these parts. A point which seems to have been very sparingly covered by authorities on engine design, and yet which seems one of vital importance to us, is the bolting of cylinders to columns, of columns to bed plates, and of bed plates to seatings in marine engines. The strain to which each of these parts is subjected being a direct strain, the necessary strength of these parts is easily found by computation based on the steam pressure and the size of the cylinders. In these parts we have found 340 cases where the cylinders were too lightly fastened to the columns, 68 cases where the columns were insufficiently secured to bed plates, and 64 cases where the bed plates were not sufficiently bolted to their seatings. We have also found several cases where the fastening at the ends of connecting rods is too light for safety.

"While it is true that in most cases where light cross-head connections and insufficient bolting of cylinders to columns, columns to bed plate and bed plate to seatings were found, the condition has occurred through the replacing of old, worn-out boilers by new boilers of higher pressure, without increasing the parts of the engines, it is also true that we have found several cases of recent construction where these parts were originally made entirely too light for safety. The use of relief valves on steam cylinders has been appreciated only since the compound engines and higher steam pressures have become common, but it is a point which has become one of vital consideration. We have found over 650 cases where the cylinders were not so safe guarded. Many of these, however, were non-condensing engines, carrying only moderate steam pressures, but we have found 58 cases where cylinders were cracked and patched, and in most of which the damage might have been avoided had there been proper reliefs.

"In the cast iron parts of engines, such as bed plates, columns and channel plates, the builders on the lakes have not been sparing in the use of metal, though we have found 66 cracked bed plates, 63 broken columns, and 5 cracked channel plates. Still, in almost all of these cases, the breakages have occurred from carelessness on the part of the engineers in allowing water to become entrapped and allowed to freeze in winter

when the boats were tied up, rather than from light construction. We have found 148 cases where the stern logs or pipes, or stern bearings, were defective. In most of these cases the defect is from decayed wood, caused by leakage, or from insufficient fastenings of the stern pipes in the stern logs.

"Our inspection of pumps, piping and connections has been especially rigid, and, while we have found very few cases of broken pumps, we have found many cases where the piping and sea connections were defective. There are 762 vessels on the lakes in which the sea connections are not fitted with non-return valves, or so that water could not, either by accident or intention, be run into the vessel. This is a fault the seriousness of which has been especially illustrated during the past winter, when a great number of vessels were loaded with grain in the fall and used for storage during the winter at Chicago. In a great many of these vessels damaged grain was found in the spring, from the leakage through the sea connections, which, if they had been fitted with non-return valves, would not have occurred.

"There are 153 vessels in which steam and water pipes passed through the coal bunkers without proper protection, and there are 92 vessels on which the fire apparatus is either out of order or insufficient.

"Our survey of the electrical equipments has, as yet, been rather superficial, and has really amounted to only the listing of boats having such equipments; but we are now starting on a very much more full and rigid inspection of these equipments. We have found 312 vessels equipped with electrical lighting apparatus. A number of these equipments are rather crude and the installation and wiring far from satisfactory, and there have been a number of cases of damage to cargoes and vessels, from fire started through defective insulation.

"We are, of course, not at liberty to say very much regarding the ratings which have been placed on the different vessels on the lakes, but there are some points in regard to the ratings on machinery which are of interest, and which we can divulge. It was not our intention to use age as a factor in the rating placed on machinery, but to base the rate entirely on the construction of the machinery and its condition of preservation. From a table compiled from the rating placed on the 1,300 odd vessels, however, the fact is shown that age does cut considerable figure with the condition. The highest classification given to any vessel built previously to our rules compiled for future construction is 100, and we rate from that down to 50, by points of five. It is interesting to note that the boats on which the machinery is rated as low as 50 were built during the following periods: Three between 1860 and 1870; four between 1870 and 1880; four between 1880 and 1890, and two since 1890. The rating of 55 is distributed about the same, although there are four boats built since 1890 rated as low as 55. This low rating, on recently built boats, is accounted for by light and faulty construction, and from the fact of their being very poorly cared for. The highest rating given to any boat built earlier than 1870 is 85. The majority of those built between 1870 and 1880, rating from 70 to 90, and of those built between 1880 and 1890 ranging from 75 to 95, although there are 62 built during this period rating as high as 100. Most of the boats rating 90, 95 and 100 have been built since 1890.

An Ill-Advised English Criticism.—Insurance Matters.

Fairplay of London is a marine journal that has been crying out for a long time past against reduced rates of premium on marine insurance. It is a publication that circulates quite generally among the principals of the big English companies and among underwriters generally throughout the world. Of late its criticisms regarding low rates accepted for lake business have been especially severe, some of them directed against the McCurdy-Prime syndicate of Chicago, on the theory that they are responsible, through urging low rates of insurance, for much of the dissatisfaction that exists in England on account of small profits on American business. Mr. Geo. L. McCurdy of Chicago seems to have forwarded to Fairplay a copy of the "Masters' Manual," recently issued by the Great Lakes Register, and in doing so sent also a copy of a formal letter that accompanied copies of the manual forwarded to lake papers. In this letter it is stated that the manual is distributed free of cost to lake vessel masters, and that the valuable information which it contains stamps it as a meritorious work, worthy of the approval of assurers and assured. Fairplay prints the letter in full with this comment:

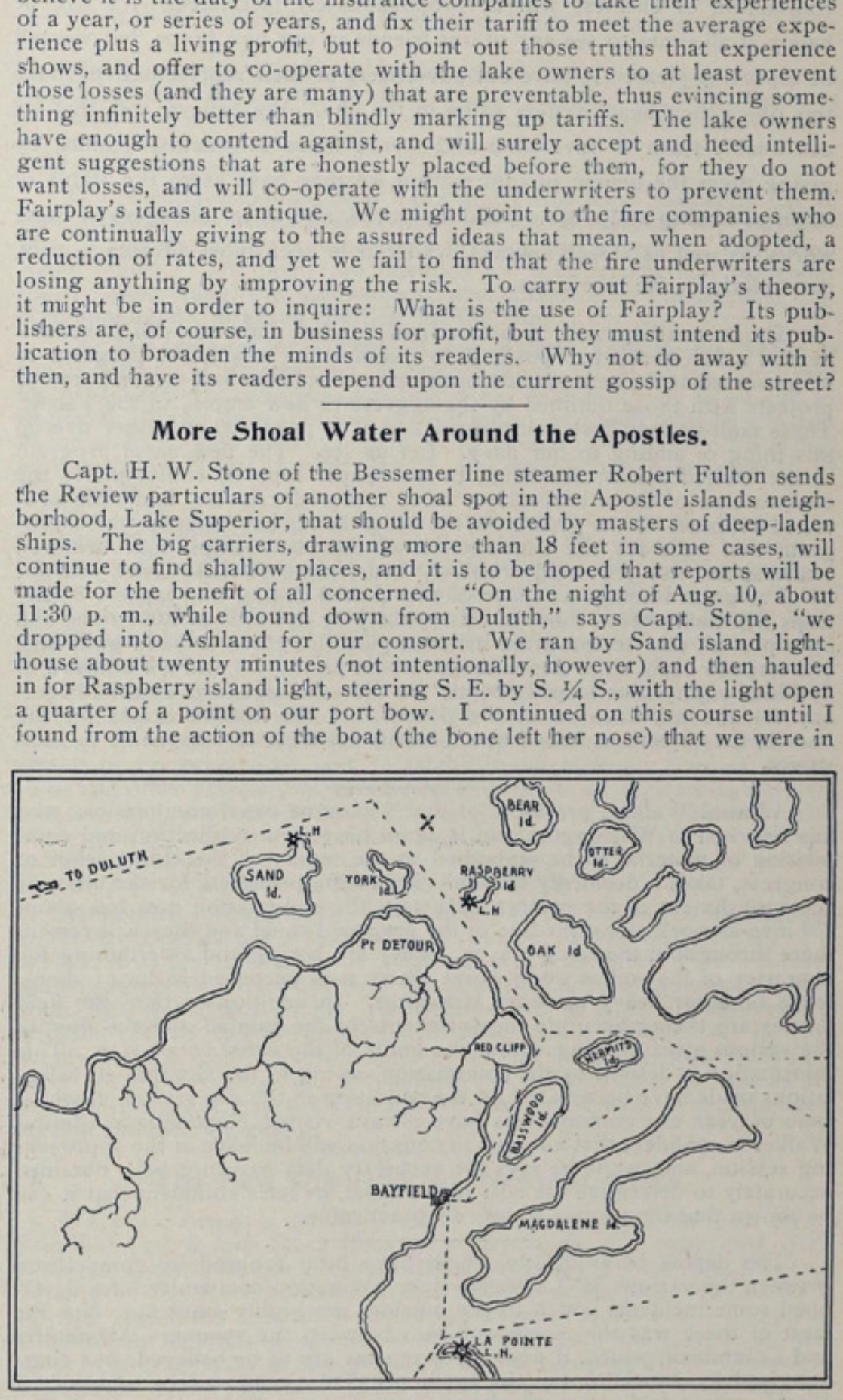
"Readers of Fairplay will not forget that Mr. McCurdy is the author of the dictum that 'the ship owner, not the underwriter, pays the loss,' and the originator of the new departure in underwriting whereby premiums may—in theory—be cut down below paying point and a profit secured by bringing pressure on owners and masters to exercise such joint and several care that casualties shall be reduced below the normal scale. The manual contains valuable advice in this direction, and if it is only strictly followed by masters they will (weather permitting) run free of disaster—only, in that event, the owners may fail to see any necessity for paying premiums. Underwriters in general will be interested in watching the working out of Mr. McCurdy's ideas in particular, and therefore it is to be hoped that Mr. McCurdy and his combination will persevere in their experiment. What with 'registers' and 'manuals' they may score an undreamt-of success; though the theorem that there ought to be premiums, but no claims, rather takes aback underwriters at this end of the old world—who do not as yet see how with casualties abolished premiums are to be got. The manual seems to be carefully compiled, and Mr. McCurdy must be credited with having taken great pains to make it a *vade mecum* for masters of lake steamers. In my opinion he would have done better in leaving navigation matters alone and changing rates of premiums calculated to leave a 'living' profit over the current scale of claims."

The drift of the foregoing argument regarding insurance on the lakes, coming as it does from the home of the big companies that have ruled in lake business of late, is significant from the fact that it is based on the theory that the only way to make the business pay is to raise the rates. Just now the Chicago syndicate, which has controlled a very large part of the lake business during the past two years, is confronted with some troubles at home on account of a stand taken in the settlement of losses on wooden vessels that is not agreeable to the owners of these vessels. Heavy losses in lake business on the rates of premium that have prevailed during the past few years are also causing some anxiety as to what another season may bring forth. The leading marine companies are certainly very much dissatisfied with hull business here. Higher rates may be demanded, and it is possible that there may be no so-called Chicago syndicate next year. The stronger companies of the syndicate may refuse to continue further in it, if reports that have been circulated regarding losses are to be relied upon. The withdrawal of such companies from the lake business would certainly result to the disadvantage of all vessel owners.

But whether the syndicate is to continue its power in lake business or not, it is certain that there are no vessel owners in this part of the world who will agree with the kind of criticism that has been directed against the "Masters' Manual" and other work of its kind put forth from Chicago. The underwriter who is content to simply mark up rates to a living profit must fail of receiving that hearty support that should be accorded to the underwriter who, drawing from his general experiences, admittedly broader than the experiences of the individual owner, gives to the lake marine such data and information as will enable it to minimize loss. The dissemination of information like that contained in the manual has met with general approval from masters of lake vessels, and their endorsement is characteristic of the men themselves, hearty and emphatic. We do not believe it is the duty of the insurance companies to take their experiences of a year, or series of years, and fix their tariff to meet the average experience plus a living profit, but to point out those truths that experience shows, and offer to co-operate with the lake owners to at least prevent those losses (and they are many) that are preventable, thus evincing something infinitely better than blindly marking up tariffs. The lake owners have enough to contend against, and will surely accept and heed intelligent suggestions that are honestly placed before them, for they do not want losses, and will co-operate with the underwriters to prevent them. Fairplay's ideas are antique. We might point to the fire companies who are continually giving to the assured ideas that mean, when adopted, a reduction of rates, and yet we fail to find that the fire underwriters are losing anything by improving the risk. To carry out Fairplay's theory, it might be in order to inquire: What is the use of Fairplay? Its publishers are, of course, in business for profit, but they must intend its publication to broaden the minds of its readers. Why not do away with it then, and have its readers depend upon the current gossip of the street?

More Shoal Water Around the Apostles.

Capt. H. W. Stone of the Bessemer line steamer Robert Fulton sends the Review particulars of another shoal spot in the Apostle islands neighborhood, Lake Superior, that should be avoided by masters of deep-laden ships. The big carriers, drawing more than 18 feet in some cases, will continue to find shallow places, and it is to be hoped that reports will be made for the benefit of all concerned. "On the night of Aug. 10, about 11:30 p. m., while bound down from Duluth," says Capt. Stone, "we dropped into Ashland for our consort. We ran by Sand island light-house about twenty minutes (not intentionally, however) and then hauled in for Raspberry island light, steering S. E. by S. ¼ S., with the light open a quarter of a point on our port bow. I continued on this course until I found from the action of the boat (the bone left her nose) that we were in



shoal water. The ship was immediately checked. About this time we touched bottom twice, but not hard; not enough, as far as we could learn, to cause any perceptible damage to the ship. Sand island light-house bore W. by S.; Devil's island light-house, N. E. ½ N. I found where these bearings intersected with our course that Sand island light-house was 5 miles distant, Devil's island light 7 miles, and Raspberry light 3 miles. The chart shows 6 fathoms of water in this vicinity. You will observe that I was a little to the eastward of the course laid down on charts. We were drawing 18 feet 2 inches when leaving Duluth."

In the reprint from the chart printed herewith the cross is located about where Capt. Stone found shoal water. Capt. Stone's description of the location is all right, but the drawing is not very satisfactory.

Willard's steam yacht agency, 15 N. Canal street, Chicago, has sold the 87-foot steam yacht Adele to Mr. A. J. Moxham, president of the Lorain Steel Co., Lorain, O.

B. B. Inman, the Duluth tugman, last week filed a petition in bankruptcy. The assets are given as nothing and the liabilities as $182,000.

MARINE REVIEW

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The editorial and business offices of the Marine Review were removed this week from room 409 Perry-Payne building to rooms 418-19 on the same floor of the building. The Review has, in this new suite of rooms, more than twice the space heretofore available, and it is believed that the transaction of business will be proportionately facilitated. We will be happy at all times to see any of our friends in our new home, but we will be especially pleased to have our advertisers or their representatives make this office their headquarters when in the city. We believe, too, that we can enable them to save time and secure more satisfactory results, by giving them the benefit of information we may have as to the status of business in ship and engine building works, and as to managers of these works, as well as vessels owners, who can be seen most advantageously, particularly in the lake cities.

Those small-spirited, if not narrow-minded, citizens who have evidenced a half-hearted disposition to criticize the new naval program to be presented at the next session of congress would do well to compare our projects with those outlined by the aggressive new empire in the Pacific. These fault-finders have complained that it is proposed to rather overdo this thing of adding to our navy. Let us see. The new naval program of the United States, according to newspaper reports, contemplates the construction of three battleships, three armored cruisers, and nine protected cruisers. Now Japan, on the other hand, has mapped out a program that calls for the construction of four battleships, four armored cruisers, and five protected cruisers. True, some of these latter will not be of as great tonnage as those of the United States, but Japan's battleships will each exceed those of this country by upwards of 2,000 tons, and on top of all this her program includes plans for three torpedo gunboats, one torpedo depot ship, eleven torpedo boat destroyers and the unheard-of flotilla of eighty-nine torpedo boats. In view of these facts and the necessity for the maintenance of the position of the United States on the Pacific, the objections raised would hardly seem either reasonable or consistent.

Admiral Walker, president of the Nicaragua canal commission, who has returned to Washington and is again busy in the collection and compilation of material to be embodied in the report of the commission to congress, takes a decidedly hopeful view of the prospects for the ultimate accomplishment of the project. He says the commission now has about 250 men at work along the line of the proposed canal and they will remain there throughout the rainy season. They are boring and ascertaining the character of the soil at every point where it is purposed to locate dams, locks or other heavy masonry structures. In addition to that, the field parties are taking accurate measurements of the rainfall and the flow of the various streams lying within the limits of the canal concession. This information is desired by the commission, owing to the fact that all calculations made have been based on the condition in the dry season, at which time of year the commissions have always visited Nicaragua. Admiral Walker is confident that a report to congress will be made at the approaching session, and, while he says the necessary data have not been obtained accurately to determine the cost of the canal, he feels confident that it can be shown that the project is entirely practicable.

The depths of animosity which have been aroused by competition between the various St. Lawrence river navigation companies have developed some incidents which to the outsider are highly amusing. Not the least of these was the recent collision between the steamers Alexandria and Columbian, which, if newspaper reports are to be believed, was characterized by some, to say the least, peculiar circumstances. Indeed, it would appear to be very much, as Capt. Thomas Wilson intimated in a communication in the last issue of the Review, that the rival companies are devoting far more time and attention to fighting each other than to attending to the needs of their patrons. This is unfortunate, even from the standpoint of the companies, for the excursion business to the St. Lawrence country has been heavier this year than ever before, and there is every prospect of a steady growth in volume were tourists treated with ordinary civility.

Mr. George Y. Wisner of Detroit, member of the Board of United States Engineers on Deep Waterways, reports that in all probability the surveys for the proposed ship-canal from the lakes to the Atlantic seaboard will be completed by Dec. 1. This evidences a commendable energy for which the board is deserving of credit.

Dates have been set for the launching of the only United States battleships not already in the water. The Illinois, building by the Newport News Ship Building & Dry Dock Co., will be launched Oct. 9, and the Wisconsin, building at the yard of the Union Iron Works, San Francisco, on Nov. 25.

A Couple of New Naval Books.

Interesting and instructive at any time, "The Steam Navy of the United States," by F. M. Bennett, is especially so at this time, when the mass of material published regarding our naval affairs contains so little that is historical in character. This large and carefully compiled volume, which has just come into its second edition, deals with the history of the United States navy as that history has been influenced by the acceptance of steam as a motive power at sea. The first steam vessels and the earliest experiments with steam in our navy are described in detail in the first chapters. Following, and extending through the book in historical order, will be found descriptions of every type of steamer taken into the naval service, from the Mississippi and Missouri of 1840 to Kearsarge and Kentucky of 1896. Particularly interesting will be found the accounts of the ironclads, swift cruisers, and other types of vessels, successful and unsuccessful, that naval exigencies called into existence during the American civil war. The text is profusely illustrated with photographic reproductions of ships and drawings of machinery, boilers and propellers. The greater possibilities and wider scope of naval operations that followed the adoption of steam are fully set forth in the chapters of the book relating to the work of the navy during the civil war. Other chapters relate the important part played by steam vessels in the Mexican war, in the Japan expedition and in the famous Paraguay expedition of 1859. One chapter presents in a very interesting manner condensed narratives of the various attempts made by the United States to solve the polar problem by means of steam exploring vessels. Interwoven with the story of the growth of the naval steamer is the history of the corps of naval engineers—the men who made the growth of the steamship possible. In this we learn much of the duties and official position of steam officers in a navy, for the author quotes freely the laws and regulations that from time to time have governed them, and he tells much of what they have done in peace and war for the navy and the country.

Published by Warren & Co., 322 Third avenue, Pittsburg, Pa., and for sale by all newsdealers.

"Our Nations Navy, Our Ships and Their Achievements," by Charles Morris, just from press, is a volume which, while avowedly eschewing the technical in its treatment of the subject, should still appeal with considerable force to naval and marine men, for a variety of reasons. The author has dealt primarily with the evolution of the American navy. His resume of the early achievements of the nation upon the water are complete, but not more ample than necessary to induce a proper understanding and appreciation of the changes which are detailed later. The development to present conditions is supplemented with very complete descriptions of the vessels of our new navy, with the details of their equipment for offense and defense. It is in this latter that the man in the service is likely to find the chief element of value in the book. Some space has also been expended in descriptions designed to enable an appreciation on the part of the lay reader of the technical terms associated with naval construction, but it is exceedingly well done and there is not enough space devoted to it to constitute an objection even to service readers. On the other hand, the descriptions of the vessels of our navy are clear, concise and comprehensive. There is embodied much that does not find a place in the ordinary presentation of this character, and there is considerable data, which, if needed but seldom, is desired very much when it does become necessary. The pictures, which are numerous, are from photographs, and many of them are particularly good. The book is brought down to the late war with Spain, and as a frontpiece there is an excellent map of Cuba and the West Indies in colors.

The book is published by J. B. Lippincott & Co., Philadelphia, and may be had of all dealers.

Ship Building Plant at Richmond, Va.

There seems to be a practical certainty that a new ship building plant will be established at Richmood, Va. William R. Trigg, president of the Richmond Locomotive & Machine Works, was one of the lowest bidders on torpedo boats and destroyers, for the construction of which the government recently asked for bids, and it is understood that he will be given contracts for several of these vessels, but Mr. Trigg now says that even should he fail to receive this contract it will make no difference in the establishment of his ship yard. Naval experts who have visited Richmond and made a careful examination of the site of the proposed plant, as well as investigated governing conditions, have had no hesitancy in saying that it is entirely feasible to establish a successful ship yard in accordance with the plans mapped out by Mr. Trigg. When the contracts for the torpedo boats and destroyers are formally signed, Mr. Trigg will be given three months by the government in which to make preparations for carrying out the contract, and there have already been submitted to the navy department satisfactory assurances of Mr. Trigg's ability to fulfill this stipulation. Engineer-in-Chief Melville of the bureau of engineering of the navy department is said to have long held strong opinions regarding the possibilities of Richmond as a ship building port, and that this is shared by many other persons is proven by the fact that a number of capitalists, not nearly all of whom reside in Richmond, have already made application for all the stock that may be for sale in Mr. Trigg's company. Engineers who have investigated the matter say that a very moderate appropriation would be sufficient to provide for the dredging of the Richmond river to a depth of 27 feet, which would accommodate warships and the largest type of merchant vessels. Proximity to the Norfolk navy yard, where war vessels could be fitted out, would, it is claimed, prove an added advantage.

Passenger Agent Whitslar of Chicago, who had charge of the excursion business of the Christopher Columbus between Chicago and Milwaukee during the past season, said before the big whaleback started for a final trip to Lake Superior, Wednesday, that she had carried during the summer months about 125,000 passengers. The Columbus will be laid up at Manitowoc after giving excursions at several points on Lakes Superior and Michigan while returning from Duluth.

PROGRESS IN THE NAVY.

ACTIVITY IN THE SEVERAL BUREAUS—AWARD OF CONTRACTS FOR THE CONSTRUCTION OF THE NEW BATTLESHIPS, TORPEDO BOATS AND DESTROYERS.

There is evidence of a determination to maintain the policy of activity inaugurated in the navy department during the recent war. The board of construction has recommended to Secretary Long that contracts for the construction of one battleship each be given to the Newport News Ship Building & Dry Dock Co., the William Cramp & Sons Ship & Engine Building Co. and the Union Iron Works. There is no doubt that this recommendation will carry, although the exact plan to be followed in the construction of the vessels has not yet been determined.

The board of construction is also ready to report to Acting Secretary of the Navy Allen a plan for the distribution of the contracts for the torpedo boats and destroyers. The plan for this apportionment is not necessarily final, but it is safe to say that in effect it will be as follows: To the Union Iron Works of San Francisco, three destroyers; the Maryland Steel Co. of Sparrow Point, four or five destroyers; Neafie & Levy of Philadelphia, two or three destroyers; Harlan & Hollingsworth Co. of Wilmington, two destroyers; Fore River Engine Co. of Massachusetts, two or three destroyers; W. R. Trigg & Co. of Richmond, one or two destroyers and three or four torpedo boats; Bath Iron Works of Maine, three or four torpedo boats; George Lawley of Boston, one or two torpedo boats. Another of the torpedo boats will go either to Lewis Nixon of Elizabethport, N. J., or to the Herreshoffs of Bristol, R. I., while, if the department shall decide still farther to distribute the work and reduce the number of boats awarded to some bidders, the Columbian Iron Works of Baltimore and the Gas Engine & Power Co. of Morris Heights, N. Y., may be awarded one boat each.

Plans for the final disposition of the auxiliary fleet are also being perfected as rapidly as possible. The sentiment in favor of the retention of some of the better yachts purchased by the government, notably the Gloucester, seems to be growing. It has been definitely decided that a sufficient number of colliers and an adequate fleet of transport ships will be retained in the service. The transports will be nominally under the control of the war rather than the navy department. The government owns only one transport on the Pacific, but all of the fifteen on the Atlantic will be permanently retained. Included in the number are the Panama, Port Victor, Rita, Mohawk, Mobile, Massachusetts, Manitoba, Minnewaska, Mississippi, Michigan, Roumania, Obdam, Berlin, Chester and the tug Britannia.

The chief topic of discussion in naval circles this week has been the unconfirmed report from Washington that the battleships Oregon and Iowa will be returned to the Pacific and stationed at Honolulu. The argument regarding the voyage which these vessels would be obliged to make has rather revived interest in the famous trip which the cruiser Columbia made across the Atlantic in 1895, and on which she averaged mail steamer speed. It has developed, too, that an interesting feature in connection with that trip was the practical equality in speed of the three propellers. The exact figures as given are as follows: Starboard engine, 1,048,240 revolutions; port engine, 1,043,409 revolutions; center engine, 1,043,093 revolutions. The mean being 1,044,914, the widest variation from the mean is only 3,326 revolutions for the passage of 167.8, or about one in three minutes.

Several important changes will be made in the navy ere long, as Admirals Matthews, Miller and Bunce will attain retiring age before the end of the year. The principal heroes of the Spanish war retire in the following order: Admiral George Dewey, commanding the Asiatic station, December, 1899; Admiral W. S. Schley, on the Porto Rican evacuation commission, October, 1901, and Admiral W. T. Sampson, on the Cuban commission, February, 1902.

Side Ballast Tanks in a Cargo Steamer.

A new type of steel screw steamer, for which several marked advantages are claimed, has recently been launched at the yards of William Gray & Co., West Hartlepool, England. This vessel, named Mancunia, has a distinctive feature in the form of side ballast tanks, which it is claimed will in a great measure obviate the old difficulty of securing sufficient capacity for water ballast without either unduly curtailing the cargo space or hampering the stowage of cargo. In the Mancunia the side tanks provide a ready means of efficient ballasting, completely under control. They can be filled or emptied without hindering the loading or discharging of cargo, and so avoid the loss of time which frequently occurs with bottom tank. The vessel will take Lloyd's highest class. Her length over all is 362 feet, breadth 51 feet, depth 27 feet, and carrying capacity 6,200 tons. She will have four masts, cutwater bow and short bowsprit, and large poop, bridge and forecastle decks.

A cellular double bottom extends throughout the ship, and with the after peak tank, will contain 1,000 tons of water ballast, while the side tanks will hold 700 tons more, a total of 1,700 tons. This should immerse the vessel sufficiently to enable the propeller and rudder to do their work properly and have the effect of reducing the risk of the machinery being strained by the propeller "racing" in heavy weather. The bottom of the forepart of the ship also will be less liable to be shaken loose, because of the extra immersion in the Atlantic trade. The side tanks extend through the main and after holds and engine room for a length of 191 feet, and to this extent the ship has double sides, which add greatly to her strength, and, as will at once be seen, to her safety also, as in many instances damage of an extent sufficient to sink ships in a short time would not extend through the inner side. These advantages, it is stated, are secured without extra material being required in the construction of the side tanks, as lower decks and other parts used in strengthening ordinary ships, and which greatly impede stowage, are dispensed with and the material applied in building the side tanks. Hence the new type loses nothing, it is claimed, as a cargo carrier. The machinery consists of a set of triple-expansion engines of over 1,400 horse power, with three main boilers to work at a pressure of 170 pounds per square inch.

Notes from the Ship Yards.—New Vessels.

Work is progressing rapidly on a four-masted schooner at the yard of G. G. Deering, Bath, Me.

Proposals will be received at the United States engineer office, custom house, St. Louis, Mo., until Oct. 1, for the construction of a steel hulled towboat.

The new steamboat building at Columbus, Miss., for the White Star Steamboat Co., was launched last week. The boat will go on the river trade between Columbus and Mobile.

A despatch from Monterey, Mexico, states that a company has been formed there to establish a steamship line between Mazatlan and other ports along the coast. It is expected that new steamers will be built.

William Rogers, of Bath, Me., has launched the four-masted barge West Virginia, a duplicate of the Kentucky, recently launched. The West Virginia, which was built for the Atlantic Transportation Co., is 246 feet in length, 44 feet beam and 19 feet depth of hold.

S. I. Kimball, general superintendent of the United States life saving service, will receive proposals at his office, Washington, D. C., until Sept. 16, for the construction of twelve Beebe-McLella self-bailing, water ballast surf boats to be delivered at the Monmouth beach life saving station, New Jersey.

The Iowa Iron Works of Dubuque, Iowa, this week launched the steel barge building for the Texas & Pacific Railroad Co. The vessel is 300 feet in length by 50 feet beam and will have a capacity of sixteen loaded or thirty-two empty cars. When completed it will be towed down the river to New Orleans.

The recently organized New York and Porto Rico Steamship Co. of Philadelphia, will, within a short time, award contracts for the construction of two steamships for the trade between the metropolis and Porto Rican points. The boats are intended for both freight and passenger trade. John Haug, the well known naval architect of Philadelphia, has been appointed consulting engineer for the line.

The tug building for Michael Moran of New York by the Neafie & Levy company of Philadelphia, to replace the tug P. H. Wise, purchased by the government, was launched this week. She is 92 feet in length, 19 feet beam, 10 feet deep; engines of compound type with cylinders 15 and 26 inches by 22-inch stroke; boilers of the Scotch pattern, 10 feet 3 inches in diameter by 11 feet 11 inches length, and capable of a steam pressure of 125 pounds.

The tug Robert M. Spedden was launched last week at the yard of the Spedden Ship Building Co. at Baltimore, Md. The vessel is 100 feet in length by 20 feet beam and 11 feet depth of hold. She will be equipped with a compound engine having cylinders of 15 and 30 inches diameter. The boiler will be 10½ feet in diameter by 10 feet 9 inches in length, built to withstand 150 pounds of steam pressure. The tug will have a speed of 15 miles an hour.

The American Indies Co., the big $18,000,000 corporation organized to develop the new possessions of the United States, has, according to its charter, the right "to build, purchase or otherwise acquire, steamships or vessels of any other class, and to establish and maintain lines of steamships and other vessels, and to enter into contracts for the carriage of passengers, mails and goods to and from the West Indian islands." The incorporators include some of the best known capitalists in New York and Philadelphia. The consul for the new company is Elihu Root and the attorneys are Sheehan & Collin of New York City.

At a recent meeting of the stockholders of the Puget Sound Tugboat Co. at San Francisco it was decided to contract for the construction of a modern steel tug to cost in the neighborhood of $100,000. The contract has not as yet been let. The new vessel will be 150 feet in length, 27 feet beam, 16½ feet deep of hold. The engines will be triple expansion with cylinders 18, 28 and 49 inches by 36-inch stroke. There will be two Scotch boilers, 12½ feet in diameter by 12 feet in length, with three furnaces each. Wrecking and fire pumps will be provided, as well as an electric light plant, and the vessel will be equipped with steam windlass, capstan and steering gear.

The New Dry Dock at Newport News.

Work was begun a few days ago, at the plant of the Newport News Ship Building & Dry Dock Co., on a dry dock that will cost over $1,000,000 and will be when completed the largest in this country, if not in the world. The Review has heretofore referred to the plans for this dock but they have lately been subjected to a number of alterations. The plans as ultimately determined upon have been outlined for the Review by Mr. W. A. Post, assistant to the president of the Newport News Company. Dimensions of the dock are: length inside the caison 806 feet; breadth on bottom 80 feet; breadth at top 162 feet. The entrance will be constructed so as to admit any vessel that can be accommodated inside the dock. The depth over the sill will be 30 feet at mean high water; mean range of the tide 2 feet 6 inches. The entrance abutments will be constructed of concrete lined with granite. The bottom of the dock will be of concrete over piling. The interior will be constructed of timber. The caison will be constructed of steel and it will be operated with trimming tanks, so arranged that it will never be necessary to pump out the water ballast, as is done with all docks previously constructed in this country. The pumping plant has been designed to empty the dock in two hours, which is at the rate of about 200,000 gallons per minute. Two first-class battleships can be repaired in this dock at one time, or the largest ocean liner contemplated at this time will have plenty of room to spare in it. The construction of the dock will be pushed ahead as rapidly as consistent with good work and a thorough consideration for details.

The revenue cutter Calumet, which was sent from the lakes, last spring, to do patrol duty in Massachusetts bay, and thence south to carry dispatches to the blockading fleet, will in future serve as a revenue cutter at the port of New York.

Around the Lakes.

Commander C. O. Allibone, light-house inspector of the ninth district, announces that a 30-foot black spar buoy was established Sept. 11, in 5½ fathoms of water, about 300 feet north of the sunken barge Winslow, which foundered during the night of Sept. 4, near White shoals, Straits of Mackinac.

At Detroit last week Judge Swan dismissed the libel of W. R. Sauter, owner of the barge O. J. Hale, against the steam barge Margaret Olwell. The case grew out of the alleged failure of the Olwell to fulfill a contract for towing the Hale from Cleveland to Detour in October, 1893. Judge Swan held that inasmuch as the Olwell did not enter upon the contract of towage (she went off without taking a line from the barge), there can be no maritime lien, and the libel was therefore dismissed, each party being responsible for his own costs, the dismissal being without prejudice should it be desired to bring personal action against the owners of the Olwell.

There is building at the works of the Cleveland Ship Building Co. at Lorain, O., a steel freight steamer in which a couple of practical vessel men are interested with Mr. Clarence A. Black of Detroit. This ship will be out in time to get in a trip or two before navigation closes, and she is expected to make a showing that will be hard to equal. It has been demonstrated that a sistership, built at the same yard, can move 6,000 tons 11 miles an hour on a development of 1,250 horse power. With this point in view it is predicted that the second vessel building at Lorain, and which is to be fitted with Howden hot draft appliances, will move 6,000 tons 11 miles an hour on 2,000 pounds of ordinary fuel.

It is not probable that a hearing will be given to the Lake Carriers' Association on the subject of Canadian canal tolls. The so-called United States and British joint high commission for the adjustment of Canadian questions will reassemble at Quebec on the 20th inst., but the disposition among both Canadian and American members is against oral hearings. The Lake Carriers' Association would, of course, present their arguments to the American commissioners only, but it is not probable that even this opportunity will be afforded them, as a letter from Mr. Chandler P. Anderson, secretary for the American commission, says that the time of the commissioners is already fully taken up. A brief will undoubtedly be prepared for the Lake Carriers' within a few days, and the Chicago Board of Trade and other commercial bodies will probably take a like course.

It would seem from the manner in which the proceedings against the Minnesota ore railroads for lower rates are being contested by officials of the two roads that there is considerable of a decision of the state commission in favor of reduced rates. The hearing in Cleveland this week was continued through three days and nearly all of the ore sales agents, as well as some of the Ohio furnace managers, were examined. The testimony of all the witnesses excepting James Corrigan and F. A. Bates of Cleveland, was entirely favorable to the railways, and was based largely on the claim that reduced rates would not increase the output of Mesabi, as that ore is already used as fully as possible in furnace mixtures, and that in any event the reduction in rail rates would go to the furnace operators, as the price of ore would be reduced accordingly. Messrs. Corrigan and Bates are interested in mines that are classed among the so-called independent properties of the Mesabi, which accounts for their testimony not being in accord with that given by other witnesses in Cleveland. The Minnesota commissioners will spend the balance of the present week hearing testimony in Chicago.

A Trim Police Boat.

The official trial of the new district police boat Lexington, designed for service in Boston harbor, developed the fact that the craft is an exceptionally satisfactory one in every respect. The Lexington, which was designed by W. E. Waterhouse of Boston and built by A. D. Storey of Essex, Mass., is 122 feet over all, 22 feet beam and 9 feet draught. She is built entirely of wood, and, despite many skeptical predictions and considerable bad weather, her builders succeeded in keeping their promise to turn the boat out complete in exactly 125 days. The installation of machinery was furnished by Bertelsen & Petersen of East Boston, Mass. The Lexington is fitted with Almy water tube boilers, and compound engines having cylinders of 16 and 36 inches diameter by 22-inch stroke. There is 66 square feet of grate surface, and the little vessel is capable of developing considerable speed. On the trial she averaged 13.3 knots under natural draft, and it is claimed that she is capable of even better things. The engines ran so smoothly during the trial that hardly the least jar from friction could be felt on deck. The Almy boilers had not the slightest difficulty in generating all the steam that could be used.

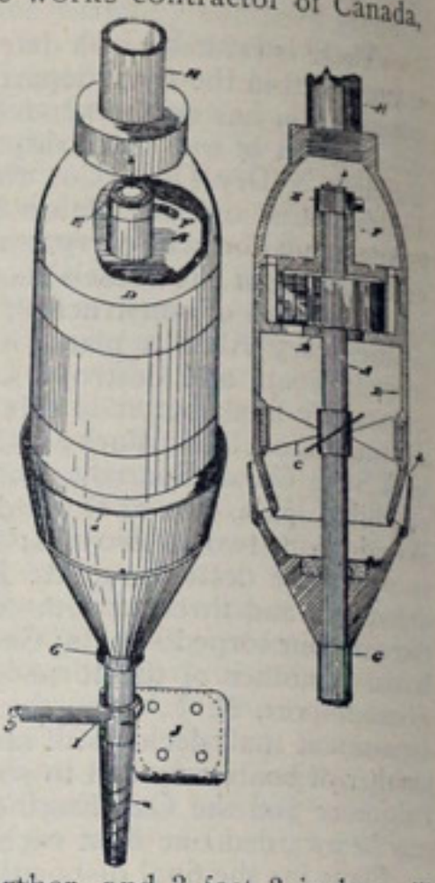
One of the handsomest, as well as most appropriate, advertising souvenirs issued this year is that just sent out by the Peerless Rubber Manufacturing Co. of 10 Warren street, New York, manufacturers of the well-known Rainbow packing. The novelty in question consists of a large colored plate of "the world's greatest battleship, the Oregon," at full speed. The effect of the picture is heightened by the representation of a huge rainbow in the background. Underneath a short description of the Oregon is the inscription: "This 'peerless' ship made a run of more than 13,000 continuous miles and went into action at Santiago—a whole fleet in herself—without having to undergo any repairs. She was fitted in all her joints with Rainbow packing, Eclipse caskets, and piston and valve rods packed with Peerless packing." A copy of this elegant color print, which is suitable for framing, will be sent free to any engineer, upon application.

The New Jersey Foundry & Machine Co., Cortlandt street, New York, have just issued a very handsome war atlas containing a number of large colored maps, which they are distributing to their patrons.

Thomas Drein & Son of Wilmington, Del., have received a contract to build forty life boats and eighteen rafts for the William Cramp & Sons Ship & Engine Building Co.

For Driving Piles Through Hard Substances.

The machine illustrated herewith is intended to overcome the great difficulty that is always encountered in driving piles through hardpan, quicksand and other compact material. It is the invention of Capt. James Culnane, a very clever mechanic and public works contractor of Canada, whose death occurred some time ago. Patents on the device, as well as one of the machines in full working order, are now owned by a brother, J. C. Culnane, who is in charge of a dredging plant at Fairport, O., for the B. & O. Co. The machine has been subjected to several trials of late, in one of which, at Fairport a few days ago, when sufficient pumping capacity was provided, it was found to work through 12 feet of hardpan. This device is far more effective than the method of using a jet in pile driving, as it actually bores the hole for the pile. It is reported that at one place where the machine was in use, not long ago, the piles being drawn were of the fender kind of rock elm, 40 feet long and 12 by 12 inches square. The pile driving machine was of the ordinary kind, namely, a ram of 2,000 pounds weight and a fall of 20 feet. The piles were pointed and an iron ring placed around the head. After 200 blows, given in from thirty-five to forty minutes, there was a split below the ring, and a piece 1 foot in length had to be cut off the top of the pile and the ring replaced; after fifteen more blows, the pile could not be driven any further, and 3 feet 3 inches still remaining above the proper height of the pile work had to be cut off. With the use of this boring machine the same sized pile, namely, 40 feet long and 12 by 12 inches square, passing through the same material, was put down its full length, without the use of the ring, in three minutes, perfectly perpendicular, in line, and close up against the other work, and to exactly the required height, with nothing to cut off the top; only the weight of the hammer resting on the head of the pile, at first, and then settling into its full depth, a few blows given, the hammer not being hoisted more than 2 feet in the leaders, completing the work. Eighty to one hnudred piles, penetrating 20 feet in depth, have been driven by this method in one working day of ten hours.



Mr. J. C. Culnane of Fairport, who now owns the patents, is offering state rights for sale or will sell the whole thing outright.

Trade Notes.

The paper, "Evolution of the Modern Engine Shaft," by Mr. H. F. J. Porter of the Bethlehem Iron Co., has just been published in pamphlet form with many full-page half-tone illustrations. Copies of the booklet may be obtained upon application to the Bethlehem Iron Co., South Bethlehem, Pa., or 1433 Marquette building, Chicago.

Andrew J. Morse & Son, 140 Congress street, Boston, manufacturers of improved diving apparatus and submarine armor, have just issued a handsome catalogue and price list. A circular enclosed with the catalogue announces that Morse & Son will hereafter include with each air pump a patent indicating gauge showing the depth of water in which the diver is working and the pressure of air. The indicating gauge is of great value, as it not only shows the air pressure and depth of water, but detects any escape of air around the plungers.

The William Powell Co. of Cincinnati has just issued a pocket edition of its No. 7 steam catalogue, which will be distributed gratuitously among its engineering friends. It is of convenient size to carry in the pocket, and besides illustrating the company's line of brass goods, embodies a lot of valuable tables and information on matters that are liable to turn up and prove very puzzling every day in the week. These latter are in convenient form and can be readily referred to. From the limited size of the edition, the matter contained has been necessarily condensed and simplified, and while useless repetition and technical obscurity have been, in so far as possible, avoided, pains have been taken to insure accuracy of statement in formulas, tables and other information.

Sanderson & Porter, contractors for the Meriden & Compounce Electric Railroad Co., have let the contract for furnishing several bridges and buildings on the line of this road to the Berlin Iron Bridge Co. of East Berlin, Conn. The work consists of seven spans of bridges, varying in length from 10 feet to 65 feet; a car barn 50 feet wide and 100 feet long, and a power house 45 feet wide and 75 feet long. The bridges are of steel, and the buildings have steel frame work, brick side walls and fire-proof roofs. The roof of the power house is covered with corrugated iron and lined with the Berlin Iron Bridge Co.'s patent anti-condensation roof lining. This lining has shown itself efficient in preventing condensation and moisture from the underside of covering and doing away with the danger and annoyance of water dripping on expensive machinery.

Capt. James Davidson of West Bay City is again out with a very strong endorsement of the Shaw-Spiegle steam towing machines, manufactured by the American Ship Windlass Co. of Providence, R. I. Among vessels which he built and on which these machines are used are two car ferries, and the steamers Rappahannock, Sacramento, Amazonas and Orinoco. Capt. Davidson says: "The automatic attachment wherein the steel wire hawser is paid out when the towing schooner encounters an extraordinary resistance, such as is occasioned by being in a sea-way, and then after this extraordinary strain is relieved, wherein the tow line is wound on the machine again, is very beneficial, especially in towing up the Sault river where there are sharp turns, and when the line becomes slack, it winds on the spool of the machine, so as to keep the tow line taut, and off from the bottom."

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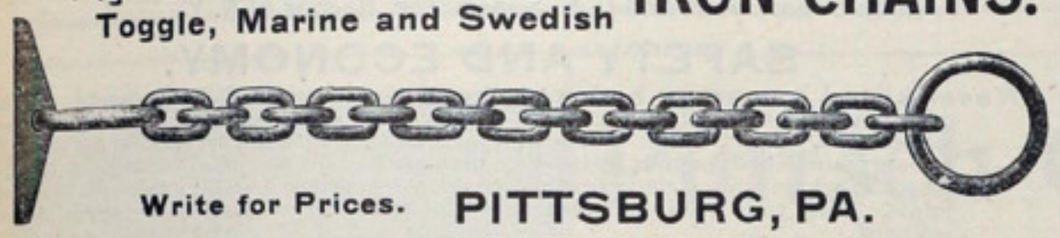

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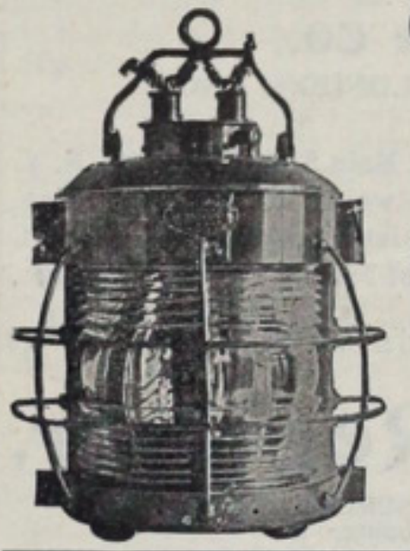

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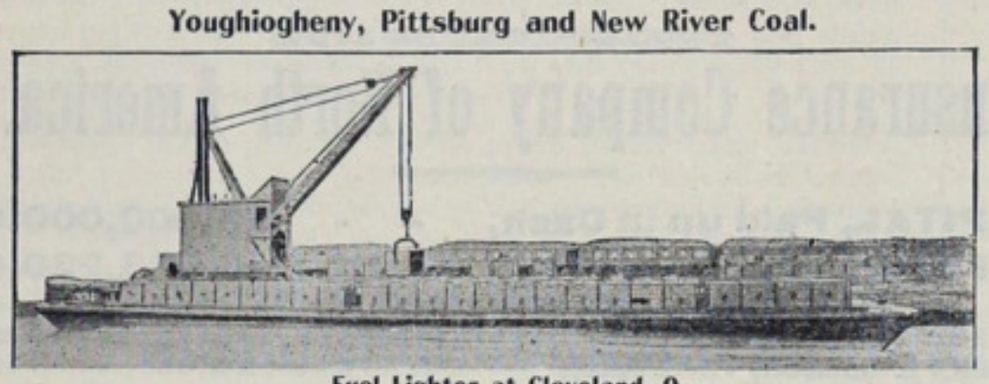

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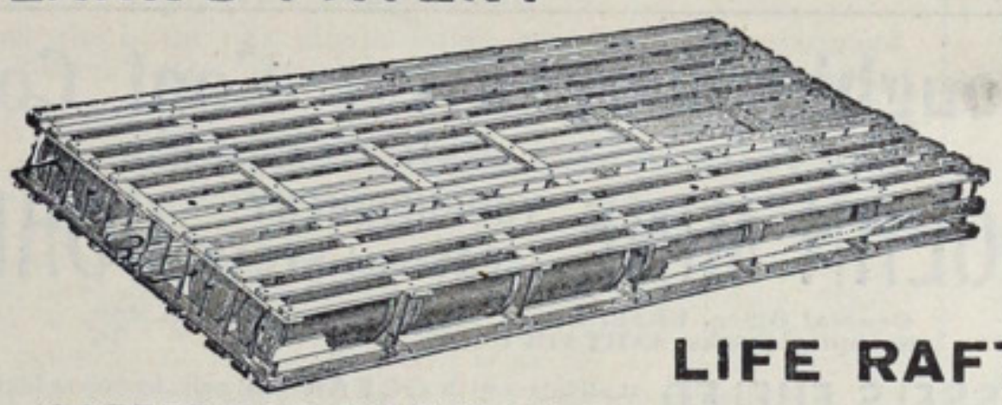

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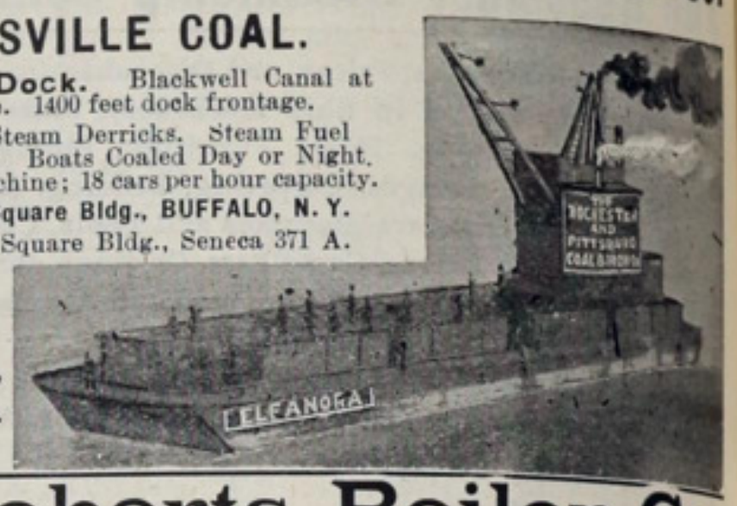

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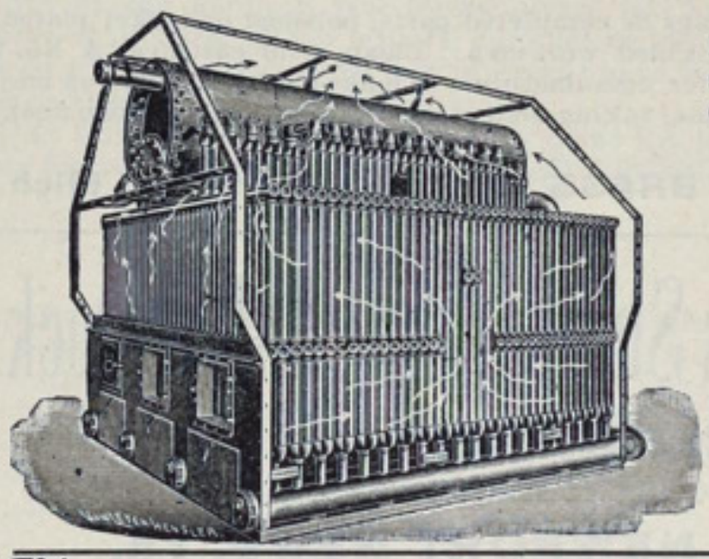

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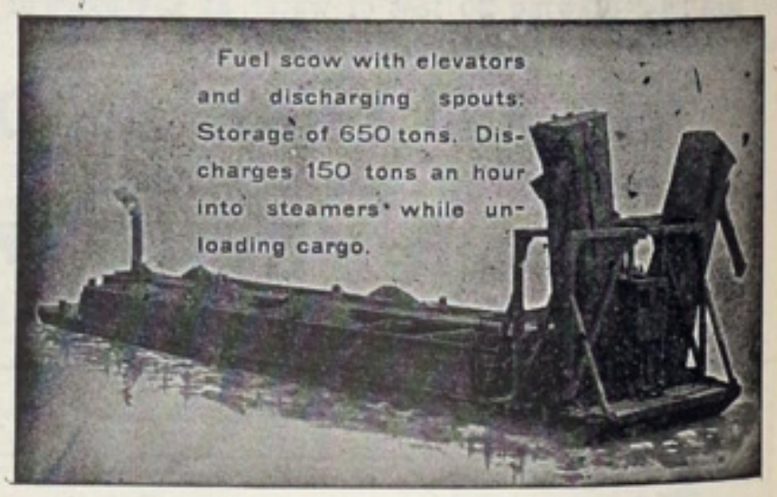
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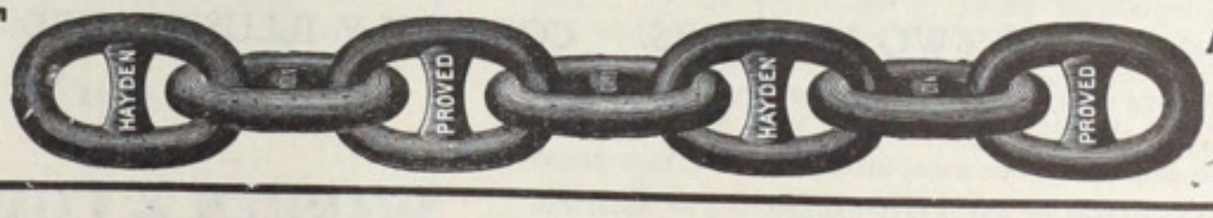

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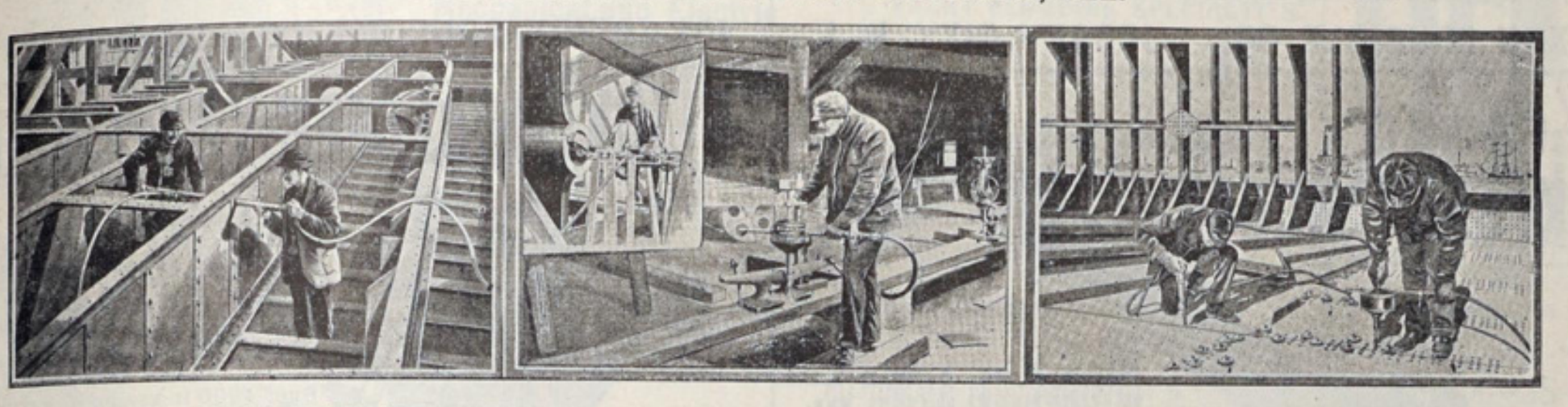

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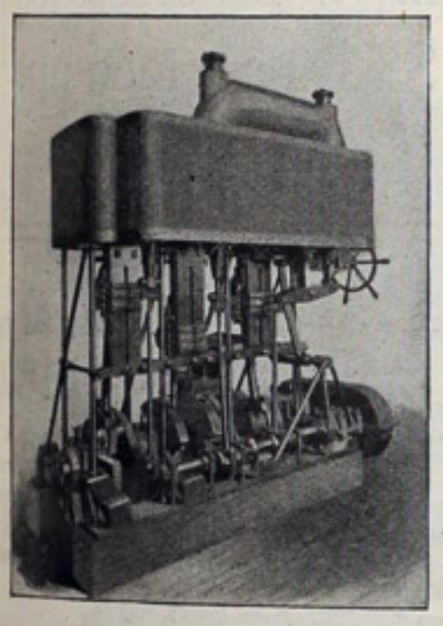

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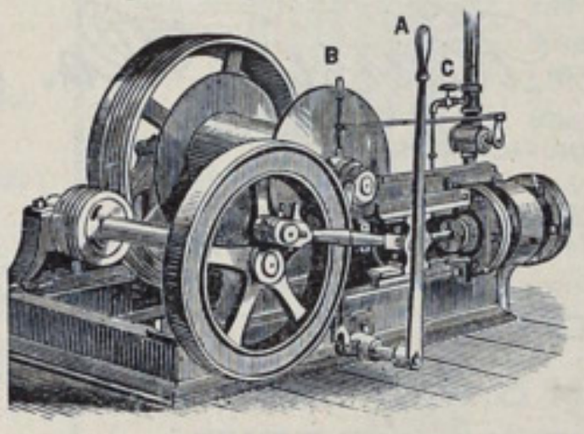

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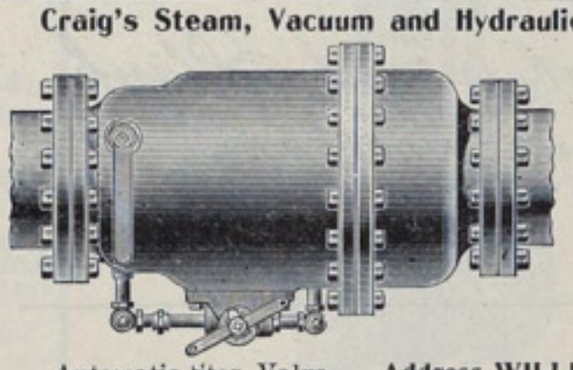

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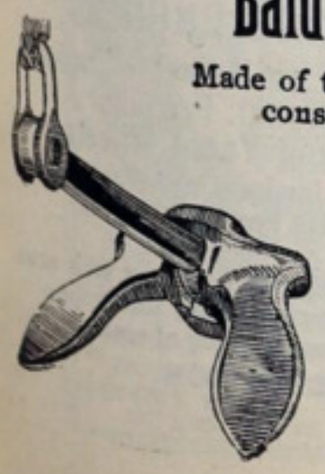

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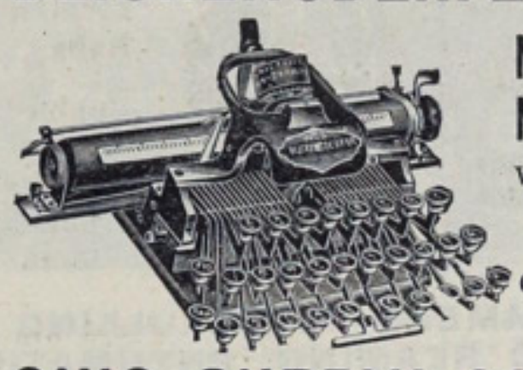

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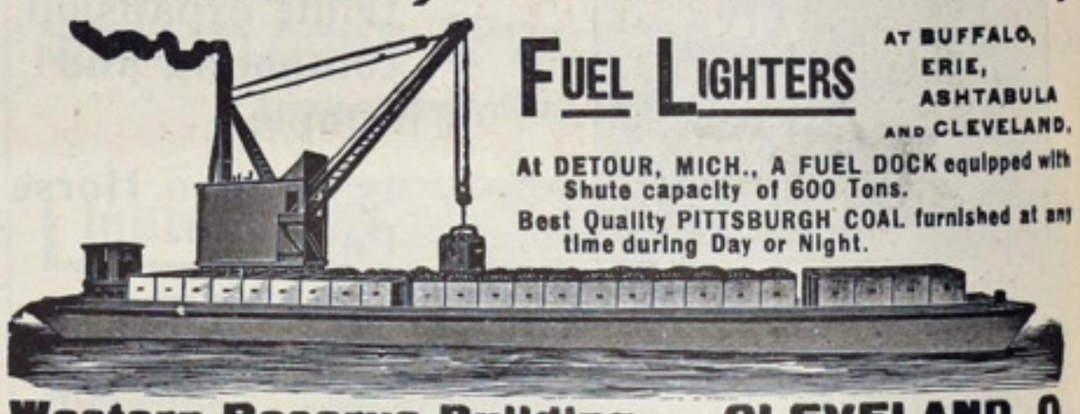

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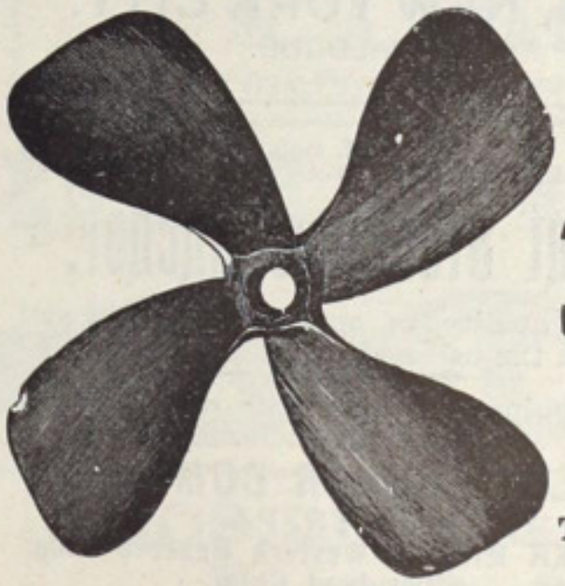

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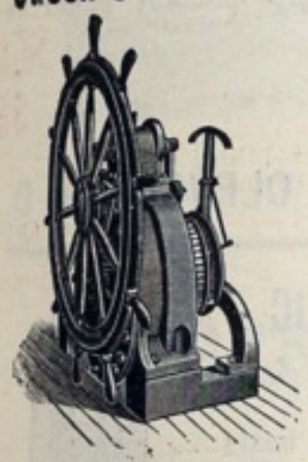

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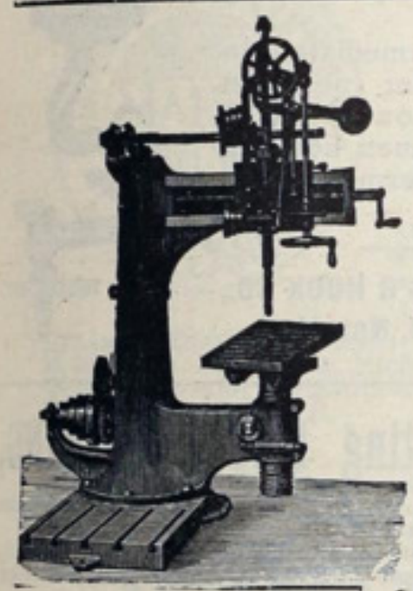

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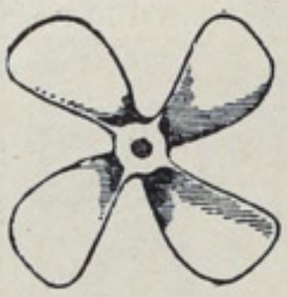

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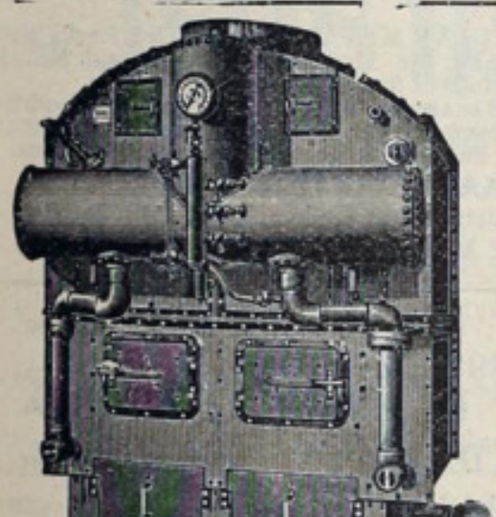

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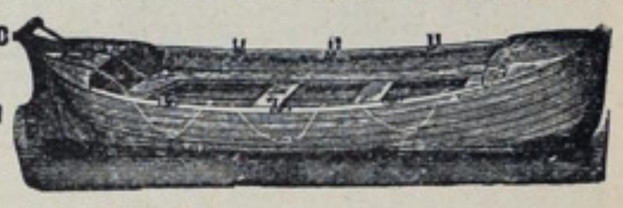

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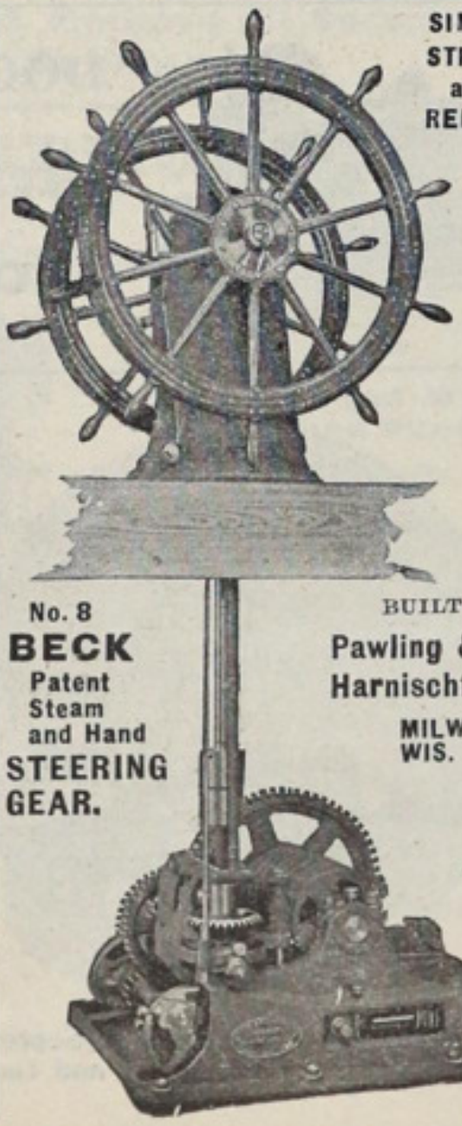

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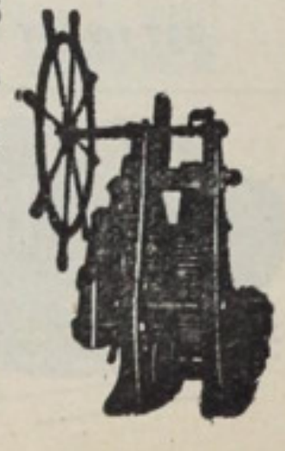

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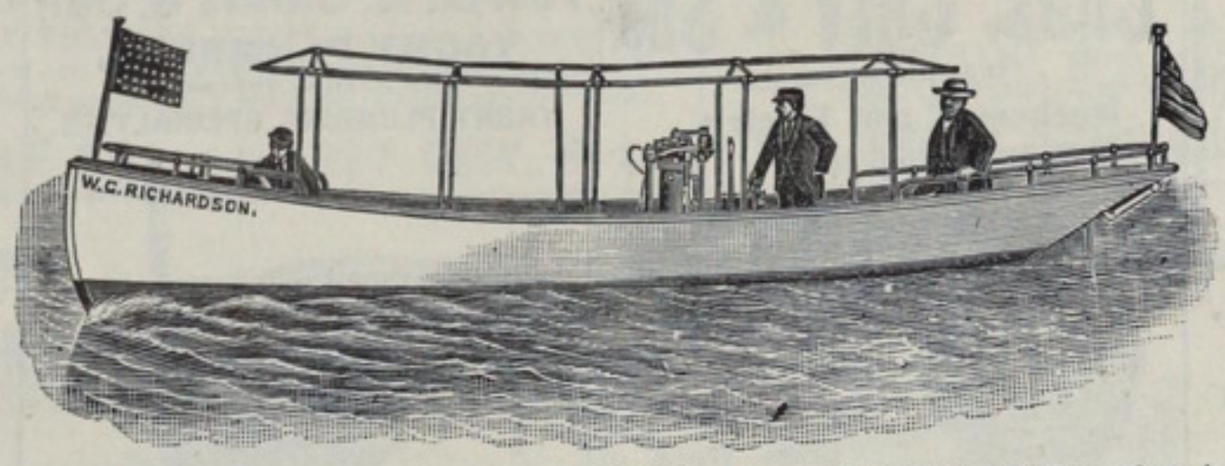

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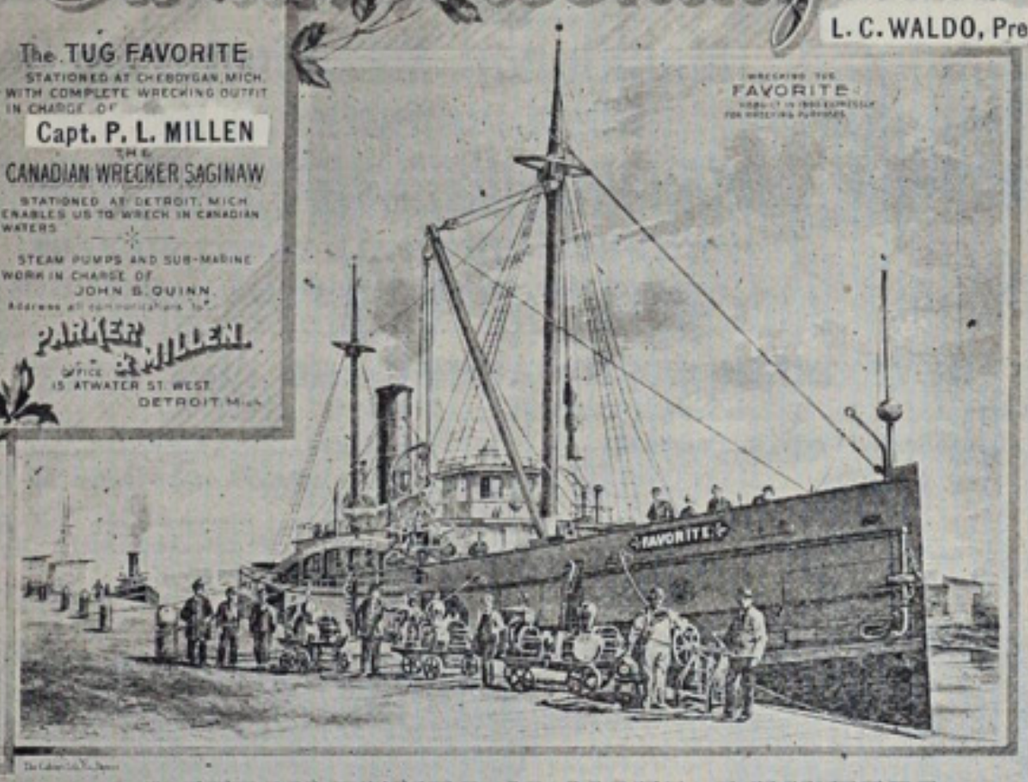

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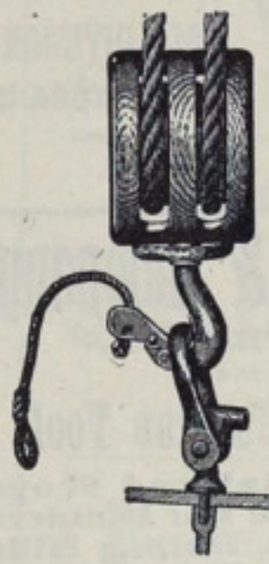

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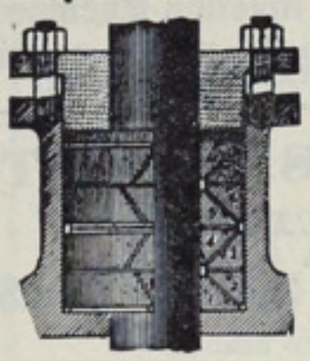

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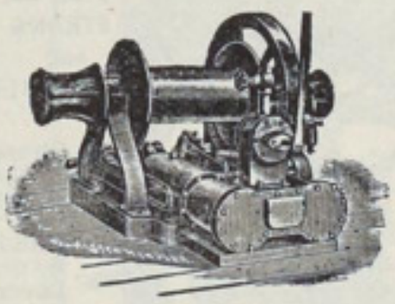

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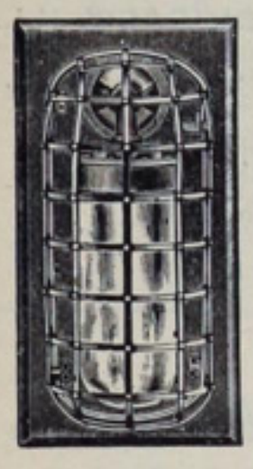

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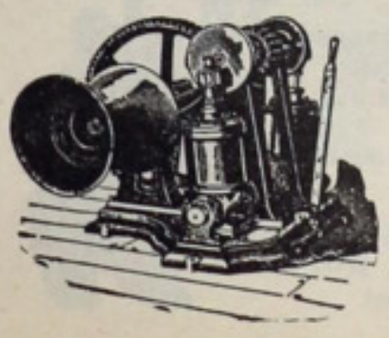

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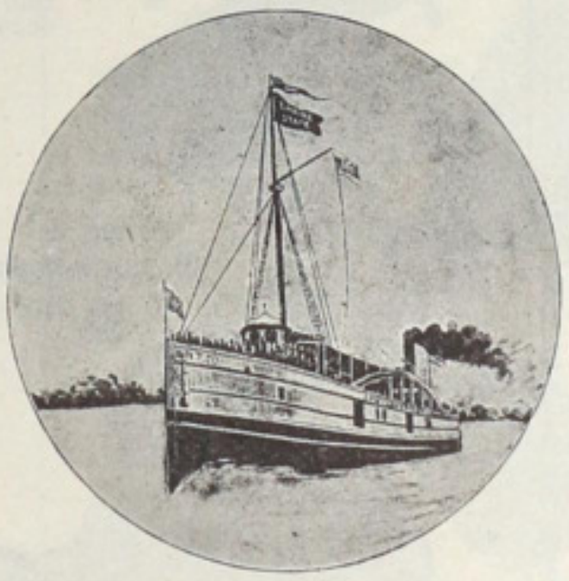

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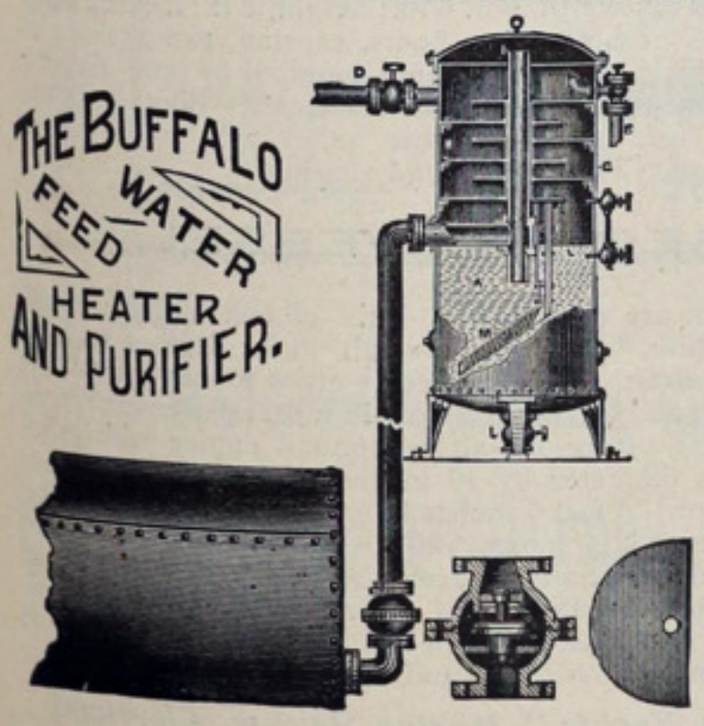

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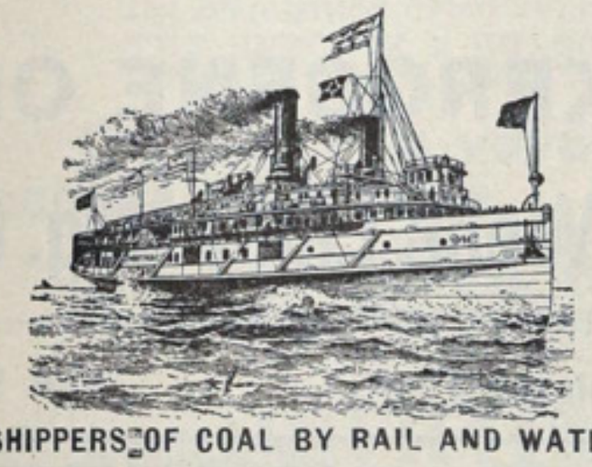

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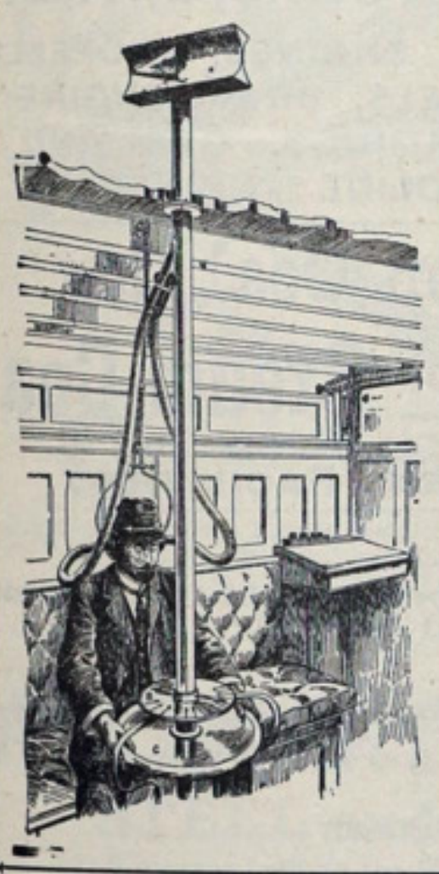

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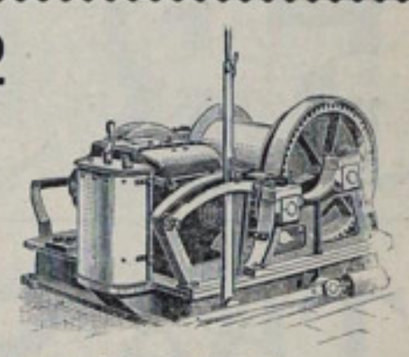

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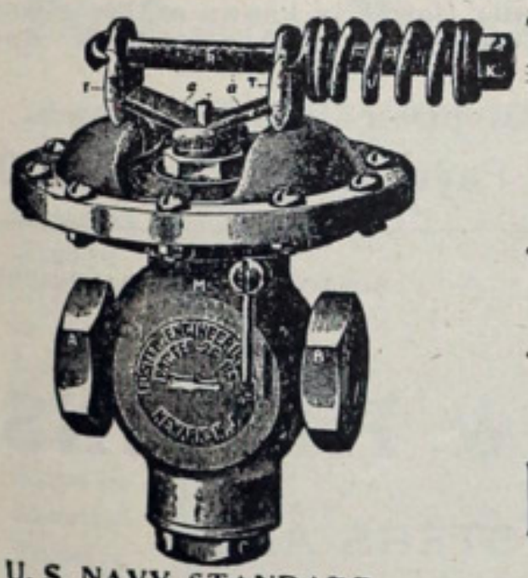

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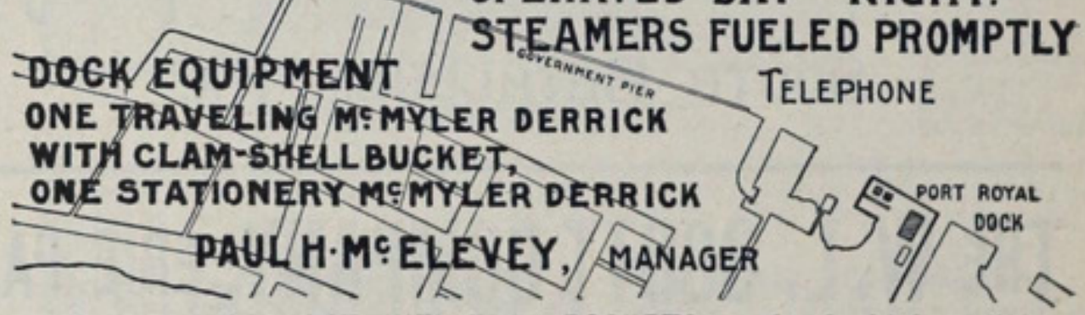

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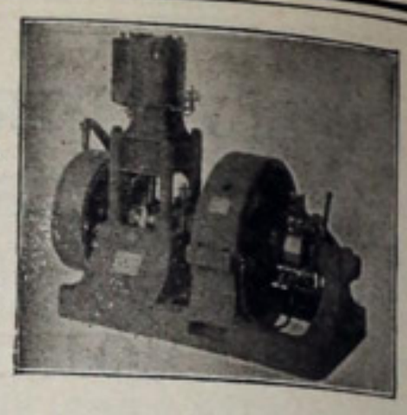

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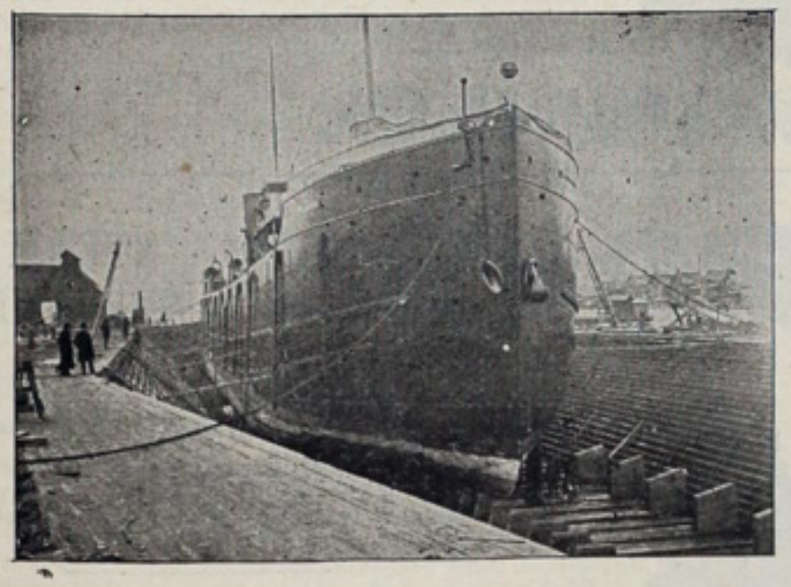

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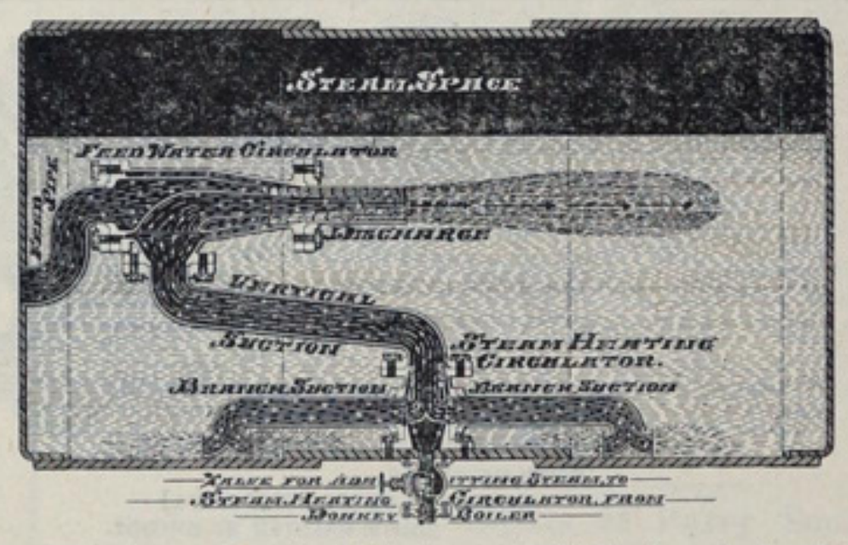

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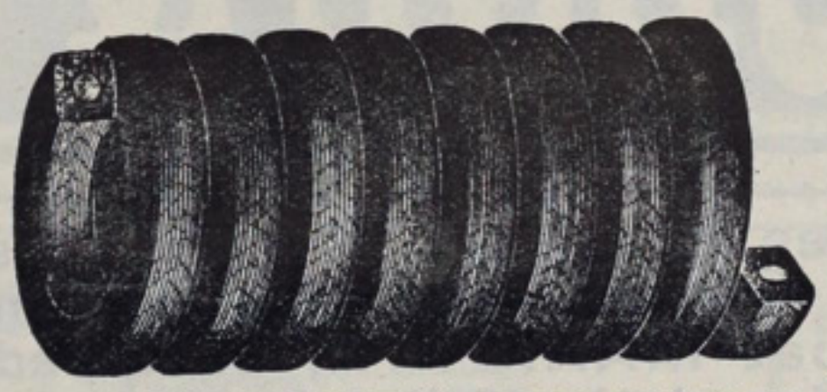

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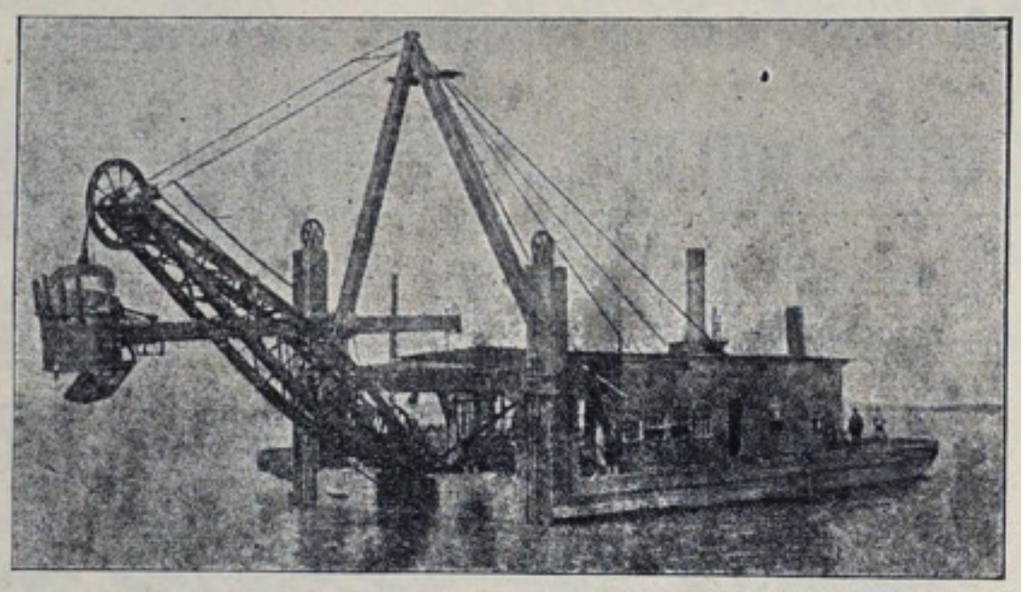

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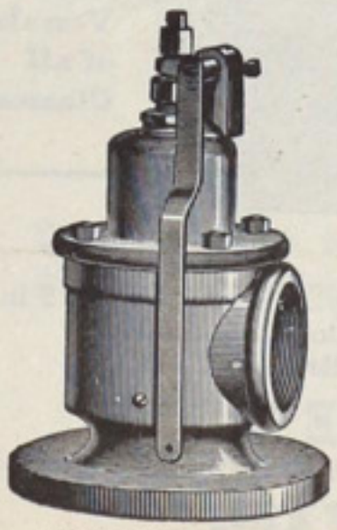

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